

Water-Related Land Use Inventories

Utah

*Southeast Colorado
Basin*



UTAH
NATURAL RESOURCES
Water Resources

**WATER-RELATED
LAND USE INVENTORY REPORT
of the
SOUTHEAST COLORADO
RIVER BASIN**

**Aerial Photography and Field Mapping
Conducted in 1990**

Prepared by

**Utah Department of Natural Resources
Division of Water Resources**

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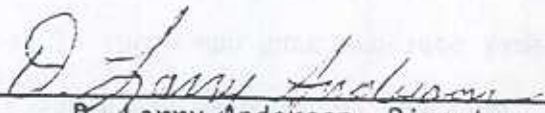

D. Larry Anderson, Director

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SUMMARY

The Water-Related Land Use Inventory Report of the Southeast Colorado River Study Unit is another in a series of land use reports prepared by the Division of Water Resources. In compiling these reports, the division has developed a program to determine water supply and water use throughout the state. The hydrologic and climatic data required to make these determinations has generally been available from other state or federal resources agencies, but up-to-date land use data has not always been available from outside sources. The land use inventory program of the division was set up to provide data needed in the preparation of water budgets, hydrologic inventory reports, and other state water planning needs.

The water-related land use data for the Southeast Colorado River Basin is displayed in the report by subarea (see Figures 5 through 20) and tabulated by subarea and county in Tables 2 and 3, respectively. They are presented in this summary as Tables i and ii.

The division inventoried over 233,346 acres of land in the Southeast Colorado River Basin drainage. This represents only about 3.4 percent of the entire Southeast Colorado Hydrologic Study Unit (approximately 6,960,990 acres). Areas not inventoried are mainly national forests and rangeland. Of the inventoried acres, 16,122 are irrigated pasture and cropland, 100,630 are wet/open water areas (including reservoirs), and 7,956 are residential/industrial areas (including farmsteads and rural housing). Dry-land agriculture (grain, beans, seeds, safflowers, etc.) is of particular significance to this area of the state, and the division mapped 106,901 acres under dry-land agriculture in the Southeast Colorado River Basin. In conducting water-related land use inventories, the division attempts to

inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agricultural lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown for this category reflect only the number of acres mapped, not the number of acres that may be in this category in the basin.

This report also discusses the Division of Water Resources' previous and present methodology of collecting and processing water-related land use data. It discusses the various land use classification codes used in past studies, and what is now considered the Standard Land Use Codes, which the division adopted in 1988 for all land use/land cover studies.

The information should be valuable to a variety of users, including county and city planners, state and federal agencies, and private land owners. The division will use the data to update water budget reports, operate basin hydrologic models, and in state planning reports.

Code	Cover	Cisco (9-1-1)	Dead Horse (9-1-2)	Castle V. (9-1-3)	Moab (9-1-4)	Cane Spr. (9-1-5)	Cottonwood Cr. (9-1-6)	LaSal (9-2-1)	Lisbon V. (9-2-2)	Summit Canyon (9-2-3)
IA1a	Orchard	0	0	35	101	0	0	0	0	0
IA1c	Vineyards & Other Horticulture	0	0	10	21	0	0	0	0	0
IA2a	Grain	25	8	0	2	40	0	0	2	0
IA2a1	Corn	0	4	3	0	0	0	43	0	0
IA2b	Vegetables	0	3	0	0	0	0	0	0	0
IA3a	Alfalfa	212	26	405	1,125	268	0	102	576	0
IA3b	Grass/Hay	26	0	11	0	0	0	6	0	0
IA3d	Pasture	110	0	82	334	108	0	361	277	0
IA4a	Fallow	42	2	123	68	40	0	0	176	0
IA4b	Idle	510	48	55	266	200	0	120	685	0
IIA1a	Pasture (subject to spring flooding)	0	0	0	0	0	0	0	0	0
Surface Irrigated Cropland Subtotal		925	91	724	1,917	656	0	632	1,716	0
IIA2a	Sub-irrigated Pasture	0	0	0	0	9	0	0	0	0
IIA2b	Sub-irrigated Grass/Hay	0	0	0	0	0	0	0	0	0
Sub-irrigated Cropland Subtotal		0	0	0	0	9	0	0	0	0
Total Irrigated Croplands		925	91	724	1,917	665	0	632	1,716	0
IIIC	Wet Flats (cattails/bullrush, etc)	174	98	94	6	7	0	0	13	0
IIIE	Riparian Areas	905	139	159	1,290	352	0	43	193	0
IIIF	Open Water	2	62	6	101	126	0	58	26	0
IIIF1	Streams	1,147	1,578	1,090	233	181	0	4	0	0
IIIF2	Reservoirs	0	0	0	0	0	0	0	0	0
IIIF4b	Sewage Lagoon	0	0	0	0	0	0	0	0	0
IIIF4c	Evaporation Ponds	0	587	0	0	0	0	0	0	0
Wet/Open Water Areas Subtotal		2,228	2,464	1,349	1,630	666	0	105	232	0
VA1	Bldgs/Homes (rural)	26	0	15	12	62	0	0	0	0
VA2	Open Spaces (feed lots, etc)	19	0	11	16	3	0	11	0	0
VB	Residential	0	0	246	2,684	172	0	0	166	1
VB3	Irr. Open Space (parks, golf courses)	0	0	0	291	1	0	0	0	0
VC	Commercial/Industrial	0	0	0	11	12	0	0	15	7
VC1	Commercial	0	0	0	8	2	0	0	0	0
VC2	Industrial	0	259	0	16	0	0	0	0	0
Residential/Industrial Subtotal		45	259	272	3,038	252	0	11	181	8
Land Use/Land Cover Totals		3,198	2,814	2,345	6,585	1,583	0	748	2,129	8

Table 1. CONTINUED.

Code	Cover	San Juan (9-3-1)	Grand Gulch (9-3-2)	Blanding (9-3-3)	Study/Subareas Monticello (9-3-4)	McElmo (9-3-5)	Wahweap S.A. (9-4)	Paria S.A. (9-5)	Total
IA1a	Orchard	0	0	21	34	0	0	26	217
IA1c	Vineyards & Other Horticulture	0	0	0	27	0	0	9	67
IA2a	Grain	0	0	166	168	0	0	200	511
IA2a1	Corn	0	0	0	0	0	0	0	50
IA2b	Vegetables	0	0	10	0	0	0	0	13
IA3a	Alfalfa	0	0	1,477	544	0	0	1,388	6,123
IA3b	Grass/Hay	0	0	440	14	0	0	55	552
IA3d	Pasture	0	0	774	761	0	0	564	3,371
IA4a	Fallow	0	0	540	124	0	0	139	1,254
IA4b	Idle	563	0	628	209	0	0	413	3,697
IIA1a	Pasture (subject to spring flooding)	0	0	0	158	0	0	0	158
Surface Irrigated Cropland Subtotal		563	0	4,056	2,039	0	0	2,794	16,113
IIA2a	Sub-irrigated Pasture	0	0	0	0	0	0	0	9
IIA2b	Sub-irrigated Grass/Hay	0	0	0	0	0	0	0	0
Sub-irrigated Cropland Subtotal		0	0	0	0	0	0	0	9
Total Irrigated Croplands		563	0	4,056	2,039	0	0	2,794	16,122
IIc	Wet Flats (cattails/bullrush, etc)	1,180	0	0	27	0	0	113	1,712
IIe	Riparian Areas	637	0	1,330	302	0	23	601	5,974
IIF	Open Water	4	0	253	139	0	10	16	803
IIF1	Streams	1,423	0	3	0	0	0	0	5,659
IIF2	Reservoirs	18,140	116	37	0	0	67,362	42	85,697
IIF4b	Sewage Lagoon	13	3	42	51	0	0	0	110
IIF4c	Evaporation Ponds	88	0	0	0	0	0	0	675
Wet/Open Water Areas Subtotal		21,485	119	1,665	519	0	67,395	772	100,630
VA1	Bldgs/Homes (rural)	0	0	52	257	0	0	0	424
VA2	Open Spaces (feed lots, etc)	0	0	38	74	0	0	25	197
VB	Residential	143	25	1,356	679	0	64	404	5,940
VB3	Irr. Open Space (parks, golf courses)	4	0	64	89	0	0	15	464
VC	Commercial/Industrial	150	6	135	135	0	0	0	471
VC1	Commercial	0	0	0	83	0	14	0	107
VC2	Industrial	0	0	69	9	0	0	0	353
Residential/Industrial Subtotal		297	31	1,714	1,326	0	78	444	7,956
Land Use/Land Cover Totals		22,345	150	7,435	3,884	0	67,473	4,010	124,708

Code	Cover	San Juan	Kane	County	Grand	Garfield	Total
IA1a	Orchard	55	0		136	26	217
IA1c	Vineyards & Other Horticulture	27	0		31	9	67
IA2a	Grain	378	20		33	180	611
IA2a1	Corn	0	0		50	0	50
IA2b	Vegetables	10	0		3	0	13
IA3a	Alfalfa	3,079	33		1,657	1,354	6,123
IA3b	Grass/Hay	454	0		43	55	552
IA3d	Pasture	1,976	0		831	584	3,371
IA4a	Fallow	912	0		203	139	1,254
IA4b	Idle	2,412	0		872	413	3,697
IIA1a	Pasture (subject to spring flooding)	158	0		0	0	158
Surface Irrigated Cropland Subtotal		9,461	53		3,859	2,740	16,113
IIA2a	Sub-irrigated Pasture	9	0		0	0	9
IIA2b	Sub-irrigated Grass/Hay	0	0		0	0	0
Sub-irrigated Cropland Subtotal		9	0		0	0	9
Total Irrigated Croplands		9,470	53		3,859	2,740	16,122
IIC	Wet Flats (cattails/bullrush, etc)						
IIE	Riparian Areas	1,269	113		330	0	1,712
IIF	Open Water	2,938	182		2,412	442	5,974
IIF1	Streams	613	10		164	16	803
IIF2	Reservoirs	2,362	0		3,297	0	5,659
IIF4b	Sewage Lagoon	32,357	53,298		0	42	85,697
IIF4c	Evaporation Ponds	110	0		0	0	110
		588	0		86	0	675
Wet/Open Water Areas Subtotal		40,238	53,603		6,289	500	100,630
VA1	Bldgs/Homes (rural)						
VA2	Open Spaces (feed lots, etc)	372	0		52	0	424
VB	Residential	115	0		57	25	197
VB3	Irr. Open Space (parks, golf courses)	2,550	65		2,921	404	5,940
VC	Commercial/Industrial	157	0		292	15	464
VC1	Commercial	460	0		11	0	471
VC2	Industrial	85	14		8	0	107
		78	0		275	0	353
Residential/Industrial Subtotal		3,817	79		3,616	444	7,956
Land Use/Land Cover Totals		53,525	53,735		13,764	3,684	124,708

INTRODUCTION

The Division of Water Resources has been charged by the Utah State Legislature with the responsibility of developing a State Water Plan. This plan would coordinate and give direction to the activities of state and federal agencies concerned with Utah's water resources. To accomplish this objective, an assessment of the land use and available water resources is being made on a continuing basis. As a basis for planning and further development, the state has been divided into 11 natural drainage basins or hydrologic study units (shown in Figure 1). The Southeast Colorado River Basin (originally designated basin No. 9) has been divided into the Southeast Colorado River Basin (retaining designation No. 9) and the Lower Colorado River Basin, which is now basin No. 10.

While land use inventories contain information on land use in the state, hydrologic inventories contain climate, hydrologic, and general information on the water resources within specific drainages. Each hydrologic inventory contains a water budget for a drainage area of the state. The water budgets provide an accounting of water inflow, outflow, yield, storage, evaporation, transpiration and uses in the study area. Hydrologic inventories currently published by the division are listed in Appendix A.

A major consideration in preparing these water budgets is the quantity of water depleted through evaporation and transpiration. Estimates of these depletions are obtained by preparing water budgets from data gathered in the water-related land use inventories. This data includes the kinds and extent of irrigated crops, as well as similar information on

phreatophytes, wet/open water areas, and residential/industrial areas. Since 1966, the division has conducted water-related land use and hydrologic inventories and other state water planning activities. These inventories are of particular importance as they relate to water use under the Upper Colorado River Compact of 1948 and the Amended Bear River Compact of 1980.

This land use report should assist in promoting the coordinated and orderly conservation, development, use, and management of water and land resources in the Southeast Colorado River Basin. It can also be a guide to local sponsors and other agencies in planning and implementing both current and long-term projects and programs. Because of the division's continuing need for up-to-date water-related land use data to accurately determine changes in water use, it plans to update this data every 7 to 10 years.

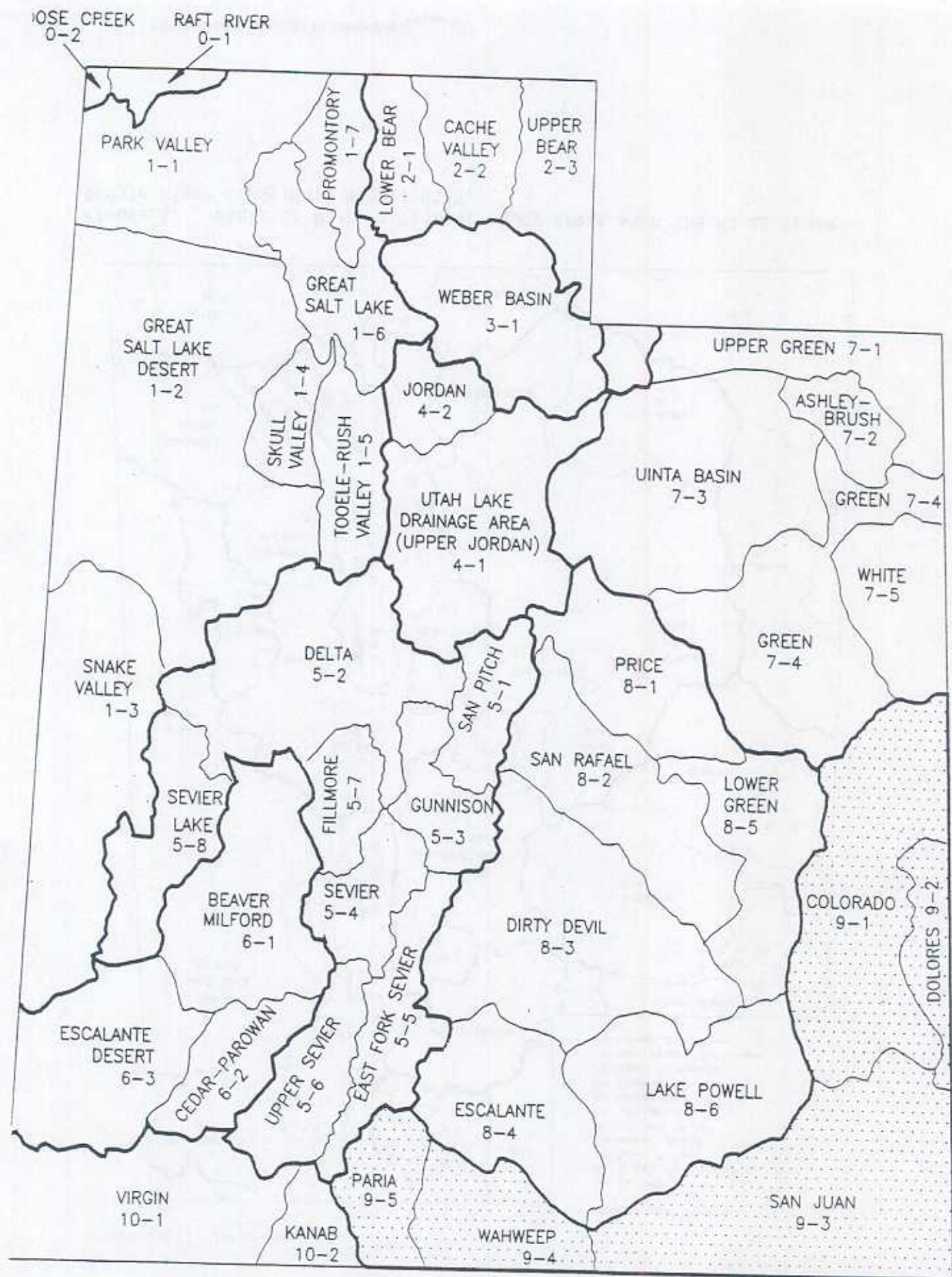


Figure 1. Hydrologic basins and study areas in the State of Utah. The Southeast Colorado River Study Unit is highlighted.

SOUTHEAST COLORADO RIVER BASIN WATER-RELATED LAND USE INVENTORY

The Southeast Colorado River Water-Related Land Use Inventory study unit was shown in Figure 2. The northern boundary is formed by the Book Cliffs. The western boundary in the north is formed by the drainage divide between the Green River and the Colorado River down to the confluence of the two rivers. The western boundary (below the confluence of the Green and Colorado Rivers) is the Colorado River, but extends to the Pink Cliffs of the Paunsaugunt Plateau in the southern portion of the state. The east and south boundaries are the Colorado and Arizona state lines, respectively. The Southeast Colorado River Basin includes the drainages of the Paria, San Juan, and Dolores rivers. It includes Arches National Park, portions of Canyonlands National Park, and Glen Canyon National Recreation Area. Figure 2 shows the Southeast Colorado River Basin divided into separate hydrologic study areas and subareas. Figure 3 is the same map overlaid by a template showing the USGS 7½ minute quadrangle maps that cover the study unit and were used in the inventory.

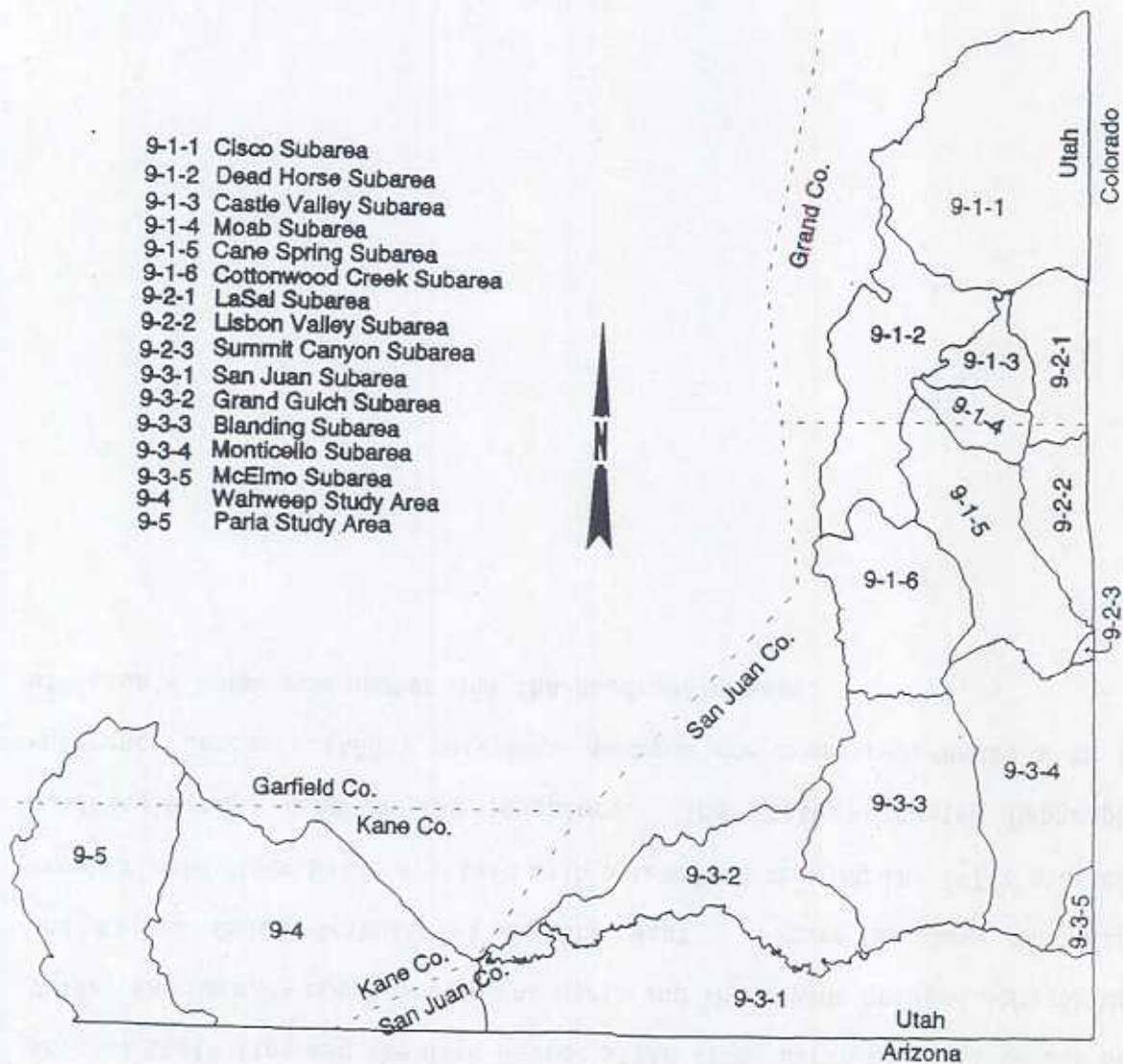


Figure 2. Hydrologic study/subareas of the Southeast Colorado River Basin.

List of 7½ min. quadrangles for Figure 3.

No. Quadrangle Name	No. Quadrangle Name	No. Quadrangle Name	No. Quadrangle Name
1. Thompson Springs	63. Eastland NW	125. Bluff NW	187. Pine Hollow Canyon
2. Sagers Flat	64. Piute Knoll	126. No Mans Island	188. West Clark Bench
3. White House	65. Poison Canyon	127. Big Bench	189. Bridger Point
4. Cisco	66. Chippean Rocks	128. McCracken Spring	190. Glen Canyon City
5. Big Triangle	67. Mount Linnaeus	129. Hatch Trading Post	191. Lone Rock
6. Marble Canyon	68. Abajo Peak	130. Ruin Point	192. Warm Creek Bay
7. Valley City	69. Monticello South	131. Skutumpah Creek	193. Gunsight Butte
8. Klondike Bluffs	70. Eastland	132. Deer Spring Point	194. Gregory Butte
9. Mollie Hogans	71. Northdale	133. Deer Range Point	195. Cathedral Canyon
10. Cisco, SW	72. Bryce Canyon	134. Calico Peak	196. Rainbow Bridge
11. Dewey	73. Tropic Canyon	135. Horse Flat	197. Navajo Begay
12. Blue Chief Mesa	74. Pine Lake	136. Fourmile Bench	198. Deep Canyon South
13. Steamboat Mesa	75. Upper Valley	137. Ship Mountain Point	199. No Mans Mesa So.
14. Jug Rock	76. Kilgallia Point	138. Needle Eye Point	200. Jacob's Monument
15. Merrimac Butte	77. Cream Pots	139. East of the Navajo	201. Oljeto
16. The Windows Section	78. Mancos Jim Butte	140. Blackburn Canyon	202. Goulding
17. Big Bend	79. Blanding North	141. Sooner Bench	203. Monument
18. Fisher Towers	80. Devil Mesa	142. Davis Gulch	204. Halgaitoh Spring
19. Fisher Valley	81. Horsehead Point	143. The Rincon	205. Mexican Hat SE
20. Dolores Point North	82. Burnt Cabin Creek	144. Alcove Canyon	206. Moses Rock
21. The Knoll	83. Tropic Reservoir	145. Nokai Dome	207. Boundary Butte
22. Gold Bar Canyon	84. Bryce Point	146. Mikes Mesa	208. Gray Spot Rock
23. Moab	85. Cannonville	147. Whirlwind Draw	209. White Mesa V. SE
24. Rill Creek	86. Henrieville	148. Slickhorn Canyon W.	210. Yellow Rock Pt. W.
25. Warner Lake	87. Canaan Peak	149. Slickhorn Canyon E.	211. Yellow Rock Pt. E.
26. Mount Waas	88. Death Ridge	150. Cedar Mesa South	212. Cedar Camp Canyon
27. Dolores Point South	89. Carcass Canyon	151. Cigarette Spr Cave	213. PR Spring
28. Musselman Arch	90. Seep Flat	152. Bluff SW	214. San Arroyo Ridge
29. Shafer Basin	91. Halls Mesa	153. Bluff	215. Jim Canyon
30. Through Spr Canyon	92. Bullfrog	154. Recapture Pocket	216. Ten Mile Can. So.
31. Cane Springs	93. Knowles Canyon	155. Montezuma Creek	217. Preacher Canyon
32. Mt. Tukuhnikivatz	94. Mancos Mesa	156. Navajo Canyon	218. Dry Canyon
33. Mount Peale	95. Chocolate Drop	157. Wicup Canyon	219. Bryson Canyon
34. Buckeye Reservoir	96. Fry Spring	158. Pine Point	220. Bar X Canyon
35. Monument Basin	97. Moss Back Butte	159. Nephi Point	221. Bogart Canyon
36. Lockhart Basin	98. Kane Gulch	160. Eightmile Pass	222. Teepee Canyon
37. Eightmile Rock	99. South Long Point	161. Fivemile Valley	223. Flume Canyon
38. La Sal Junction	100. Hotel Rock	162. Lower Coyote Spring	224. Antone Canyon
39. La Sal West	101. Black Mesa Butte	163. Nipple Butte	225. Harley Dome
40. La Sal East	102. Blanding South	164. Tibbet Bench	226. Bitter Creek Well
41. Ray Mesa	103. Bradford Canyon	165. Smoky Hollow	227. Sego Canyon
42. Spanish Bottom	104. Bug Canyon	166. Sit Down Bench	228. Calf Canyon
43. The Loop	105. Papoose Canyon	167. Mazuki Point	229. Cisco Springs
44. North Six-Shooter Pk	106. Podunk Creek	168. Navajo Point	230. Danish Flat
45. Harts Point North	107. Rainbow Point	169. Nasja Mesa	231. Agate
46. Hatch Rock	108. Bull Valley Gorge	170. Wilson Creek	232. Westwater
47. Sandstone Draw	109. Slickrock Bench	171. Deep Canyon North	
48. Lisbon Valley	110. Butler Valley	172. No Mans Mesa North	
49. Lisbon Gap	111. Horse Mountain	173. Monitor Butte	
50. Cross Canyon	112. Petes Cove	174. Oljeto NE	
51. Druid Arch	113. Collet Top	175. Goulding NW	
52. South Six-Shooter Pk	114. Basin Canyon	176. Goulding NE	
53. Harts Point South	115. Big Hollow Wash	177. The Goosenecks	
54. Photograph Gap	116. The Rincon NE	178. Mexican Hat	
55. Church Rock	117. Halls Crossing	179. San Juan Hill	
56. Sop Canyon	118. Halls Crossing NE	180. White Rock Point	
57. Summit Point	119. Burnt Spring	181. Hogan Mesa	
58. House Park Butte	120. Clay Hills	182. White Mesa Village	
59. Cathedral Butte	121. Red House Spring	183. Aneth	
60. Shay Mountain	122. Pollys Pasture	184. Peters Nipple	
61. Monticello Lake	123. Cedar Mesa North	185. Johnson Lakes	
62. Monticello North	124. Snow Flat Spr Cave	186. Petrified Hollow	

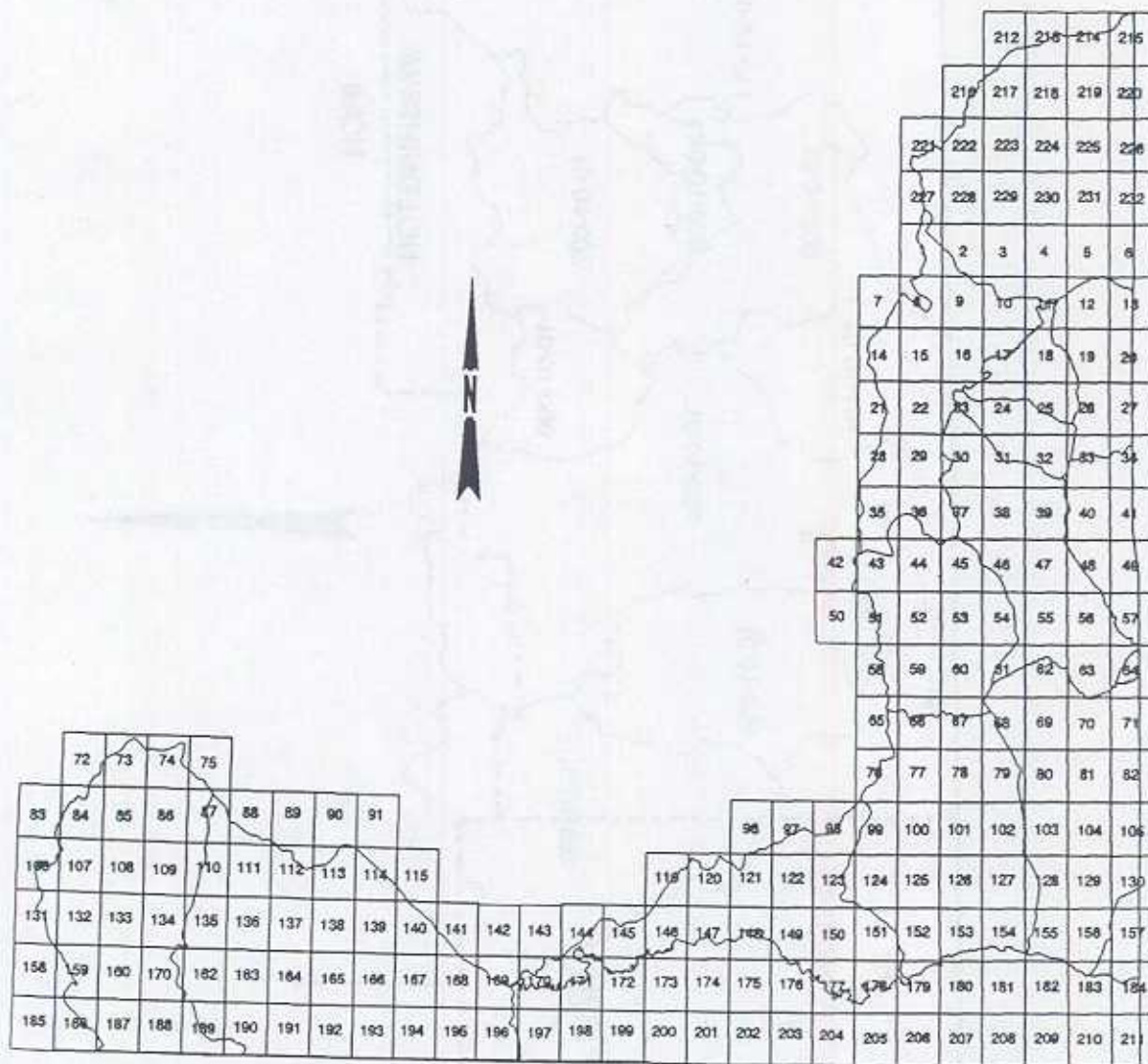


Figure 3. Southeast Colorado River Basin with hydrologic study area boundaries and overlaid by a template showing USGS 7 1/2 minute quadrangle maps.

OPERATIONS USED IN LAND USE DATA ACQUISITION

Aerial Photography

Aerial photography of the study area was begun in July of 1990. Mapping & Analytical Photographic Services Inc., Salt Lake City, Utah, photographed the study area using a turbo-charged Cessna TU-206 aircraft specially modified for aerial photography. An ARNAV R-40 Loran C navigational system kept the plane on line, while a Canon 35mm camera in the photo well took the photos. All slides were taken on 35mm Ektachrome film and processed by Kodak labs. Slides were identified according to flight line number, cross-referenced on a special location map, and delivered to the division beginning late July and early August 1990. The actual flight date was written on each slide frame by the division. Approximately 1,200 slides were delivered to the division covering the water-related land use in the study unit. These slides may be viewed at the Division of Water Resources, Planning Section, 1636 West North Temple, Salt Lake City, Utah. Copies of the slides may also be purchased from the division.

Field Mapping and Checking

Transferring data from 35mm slides to the field maps commenced in late July of 1990 and continued until the end of August 1990. Slide cataloging, filing and mapping were done concurrently. Field checking/mapping also commenced in July 1990 and continued through the first week of September 1990.

Digitizing and Processing

The data resulting from digitizing the field maps was processed through the Utah State Automated Geographic Reference Center (AGRC) during the fall and winter of 1990-91. The data is maintained at both the AGRC and the Division of Water Resources. Maps and data can be obtained from the AGRC at the Office of Planning and Budget, State Office Building, Salt Lake City, Utah.

A draft map of the cropland cover types was printed for each 7½ minute quadrangle map for the purpose of checking the data. Each map was laid over the corresponding field map on a light table, and the cropland types and boundaries were double-checked for accuracy. Any corrections or additions were marked in red on the draft map for future updating. The corrected maps were updated and stored on the AGRC system.

SOUTHEAST COLORADO LAND USE DATA

The list of cover types and codes used for the Southeast Colorado inventory is shown in Table 1. This list was standardized in 1988 and is further discussed in the land use categories portion of this report. Figure 4 shows the general location of the water-related land use areas mapped in the Southeast Colorado River Study Unit. Figures 5-20 show the water-related land use areas for each hydrologic study/subarea. The explanation opposite each of these figures shows the land cover categories and the number of acres of land in each category.

Division policy is to publish it's land use data in these types of reports; detailed maps, however, will not be included. With the establishment of the Automated Geographic Reference Center (AGRC) for the state of Utah, the division policy is to supply the land use data to them for further distribution. Detailed maps can be obtained directly from the AGRC.

Table 1. List of 1988 Standard Cover Types and Codes for the State of Utah.

Code	Cover Type	Comments/Explanations
I	Cropland	
IA	Irrigated Cropland ^a	(Rotation Crops)
IA1	Horticulture & Specialty Crops ^a	
IA1a	Fruit	(Orchards)
IA1a1	Cherry	
IA1a2	Apple	
IA1a3	Peach	
IA1a4	Pear	
IA1a5	Apricot	
IA1a6	Other	
IA1b	Nuts	(Groves)
IA1b1	Walnut	
IA1b2	Pecan	
IA1b3	Other	
IA1c	Vineyard	(Grapes)
IA1d	Bush Fruit	
IA1e	Berries	
IA1f	Other Horticulture	(Nurseries)
IA1g	Other Specialty Crops	
IA2	Row and Close Grown Crops ^a	
IA2a	Grain	
IA2a1	Corn	
IA2a2	Sorghum	
IA2a3	Wheat	
IA2a4	Barley	
IA2a5	Oats	
IA2a6	Other Grains	
IA2b	Vegetables	
IA2b1	Potatoes	
IA2b2	Onions	
IA2b3	Beans	
IA2b4	Tomatoes	
IA2b5	Sweet Corn	
IA2b6	Other	(Melons, Squash, etc.)

^a Required for the basic vegetative cover information of the state.

Table 1. Continued.

Code	Cover Type	Comments/Explanations
IA3	Forage Crops ^a	
IA3a	Alfalfa	
IA3b	Grass Hay	
IA3c	Grass/Turf	(Turf Farms)
IA3d	Pasture	
IA3e	Other	
IA4	Other ^a	
IA4a	Fallow	(Plowed or disked)
IA4b	Idle	(Overgrown more than one season)
IB	Non-Irrigated Cropland ^a	(Rotation Crops)
IB1	Row and Close-Grown Crops	
IB1a	Grain, Beans, Seeds	
IB1a1	Wheat	
IB1a2	Other Grains	(Barley, etc.)
IB1a3	Dry Beans	
IB1a4	Safflower	
IB1a5	Other	
IB2	Hayland Crops ^a	
IB2a	Alfalfa	
IB2b	Pasture	
IB2c	Other	
IB3	Other ^a	
IB3a	Fallow	(Plowed, Stubble, Mulch)
IB3b	Idle	(Overgrown more than one season)
II	Grassy/Phreatophytes/Open Water Areas	
IIA	Grassy Aspect ^a	
IIA1	Irrigated ^a	
IIA1a	Pasture	(Subject to spring flooding)
IIA1b	Hayland	(Subject to spring flooding)
IIA2	Non-Irrigated ^a	
IIA2a	Pasture	(Receives subsurface water)
IIA2b	Hayland	(Receives subsurface water)
IIA2c	Non-Agricultural Use	(Receives subsurface water)
IIB	Cattail/Bullrush Aspect ^a	
IIC	Wet Flats ^a	(Mud flats w/little or no vegat)

^aRequired for the basic vegetative cover information of the state.

Table 1. Continued.

Code	Cover Type	Comments/Explanations
IID	Shrub Aspect ^a	(Salt Brush, Sagebrush)
IIE	Riparian ^a	
IIE1	Forested Aspect	(Cottonwoods, Birch)
IIE2	Shrub Aspect	(Willows)
IIF	Open Water ^a	
IIF1	Streams ^a	
IIF2	Reservoirs ^a	(Man-Made)
IIF3	Ponds & Lakes ^a	
IIF4	Other ^a	
IIF4a	Temporary Flooded	
IIF4b	Sewage Lagoon	
IIF4c	Evaporation Pond	
III	Rangeland and Forestland	
IIIA	Alpine Plant Communities ^a	
IIIB	Conifer ^a	
IIIB1	Douglas Fir - White Fir	
IIIB2	Ponderosa Pine	
IIIB3	Fir - Spruce	
IIIB4	Lodgepole Pine	
IIIB5	Pinion Pine - Juniper	
IIIB6	Other	
IIIC	Deciduous ^a	
IIIC1	Aspen	
IIIC2	Mountain Brush	(Oak Brush, Maples, Chaparral)
IIIC3	Other	
IIID	Grass Aspect ^a	
IIID1	Dry Pastures - Improved	(Chained & reseeded)
IIID2	Native Grasses	
IIID3	Other	(Forbs)
IIIE	Shrub Aspect ^a	
IIIE1	Northern Desert Shrubs ^a	
IIIE1a	Sagebrush	
IIIE1b	Other	(Shadscale, Greasewd, Halogeton)

^aRequired for the basic vegetative cover information of the state.

Table 1. Continued.

Code	Cover Type	Comments/Explanations
IIIE2	Southern Desert Shrubs ^a	
IIIE2a	Creosote Bush	
IIIE2b	Other	(Forbs, Annual Grasses)
IIIE3	Salt Desert Shrubs ^a	
IIIE3a	Shadscale	
IIIE3b	Greasewood	
IIIE3c	Saltbrush	
IIIE3d	Desert Molley	
IIIE3e	Other	(Halogeton)
IV	Barren Lands	
IVA	Bare Soil/Sand ^a	
IVA1	Dry Salt Flats	
IVA2	Beaches	
IVA3	Sandy Areas Other Than Beaches	(Desert Sand Dunes)
IVA4	Other	
IVB	Rock Outcrops ^a	
IVC	Excavated Lands ^a	(Quarries, Gravel Pits)
IVD	Other ^a	
V	Built-Up Land ^a	
VA	Farmsteads ^a	
VA1	Buildings/Homes	
VA2	Open Spaces	(Feed Lots, etc.)
VB	Residential ^a	
VB1	Buildings/Homes	(High density)
VB2	Buildings/Homes	(Low density)
VB3	Open Spaces	(Parks, Golf Courses)
VB4	Idle Spaces	(Not irrigated)
VC	Commercial/Industrial ^a	
VC1	Commercial	
VC2	Industrial	
VC3	Open Spaces	
VD	Transportation, Communications, Utilities ^a	
VE	Other ^a	

^a Required for the basic vegetative cover information of the state.

Land cover summary in the Southeast Colorado
River Drainage Basin (reference Figure 4).

Code	Land Cover	Acres
IA1a	Fruit	217
IA1c	Vineyards	58
IA1f	Other Horticulture	9
IA2a	Grain	611
IA2a1	Corn	50
IA2b	Vegetables	13
IA3a	Alfalfa	6,123
IA3b	Grass/Hay	552
IA3d	Pasture	3,371
IA4a	Fallow	1,254
IA4b	Idle	3,697
IIA1a	Grass/Hay (subject to spr. floodg)	158
IIA2a	Sub-irrigated Pasture	9
IB1a	Grain/Beans/Seeds	29,211 ^a
IB1a3	Dry Beans	7,838 ^a
IB1a4	Safflowers	6,255 ^a
IB2a	Alfalfa	3,517 ^a
IB2b	Non-Irrigated Pasture	1,488 ^a
IB3a	Non-Irrigated Fallow	28,202 ^a
IB3b	Idle	30,390 ^a
IIB	Cattail/Bullrush Aspect	140
IIC	Wet Flats	1,572
IIE	Riparian Areas	5,974
IIF	Open Water	803
IIF1	Streams	5,659
IIF2	Reservoirs	85,697
IIF4b	Sewage Lagoon	110
IIF4c	Evaporation Ponds	675
IVC	Excavated Lands	1,118
VA1	Bldgs/Homes (rural)	424
VA2	Open Spaces (feed lots, etc)	197
VB	Residential	5,940
VB3	Open Space (parks, golf courses)	464
VB4	Idle Space (non-irrigated)	349
VC	Commercial/Industrial	471
VC1	Commercial	107
VC2	Industrial	353
VC3	Comm/Indust Open Spaces	270
Total		233,346

^aIn conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agricultural lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown for this category reflect only the number of acres mapped, not the number of acres that may be in this category in the basin.

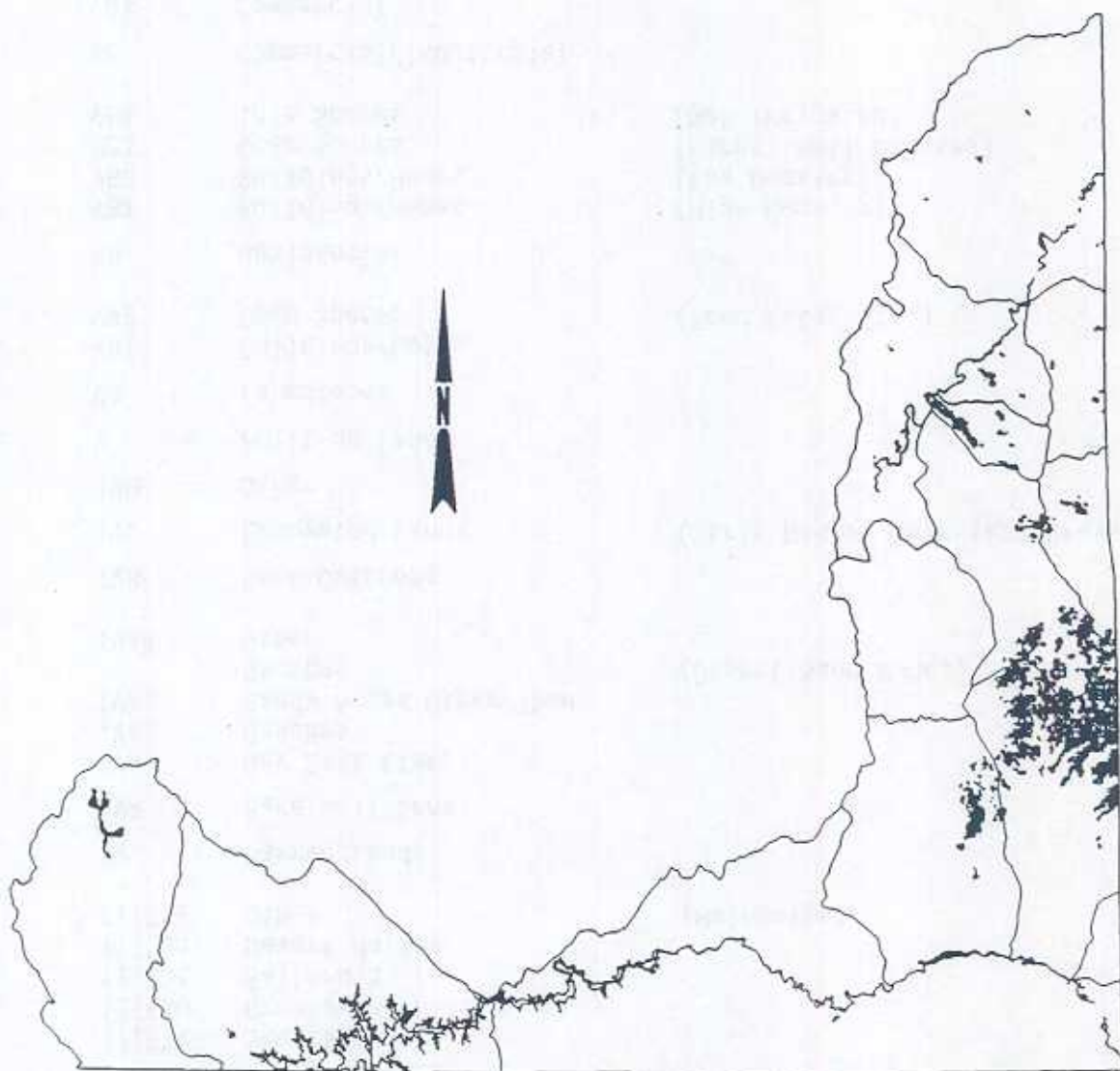


Figure 4. Water-related land use mapped areas in the Southeast Colorado River Basin.

Land cover summary for the Cisco Subarea^a
(9-1-1), referenced to Figure 5.

Code	Land Cover	Acres
IA2a	Grain	25.3
IA3a	Alfalfa	212.1
IA3b	Grass/Hay	26.2
IA3d	Pasture	109.9
IA4a	Fallow	42.2
IA4b	Idle	510.0
IIC	Wet Flats	174.2
IIE	Riparian Areas	905.4
IIF	Open Water	1.5
IIF1	Streams	1,146.8
VA1	Bldgs/Homes (rural)	25.7
VA2	Open Spaces (feed lots, etc)	18.8
Total		3,198.1

^aTotally within Grand County.

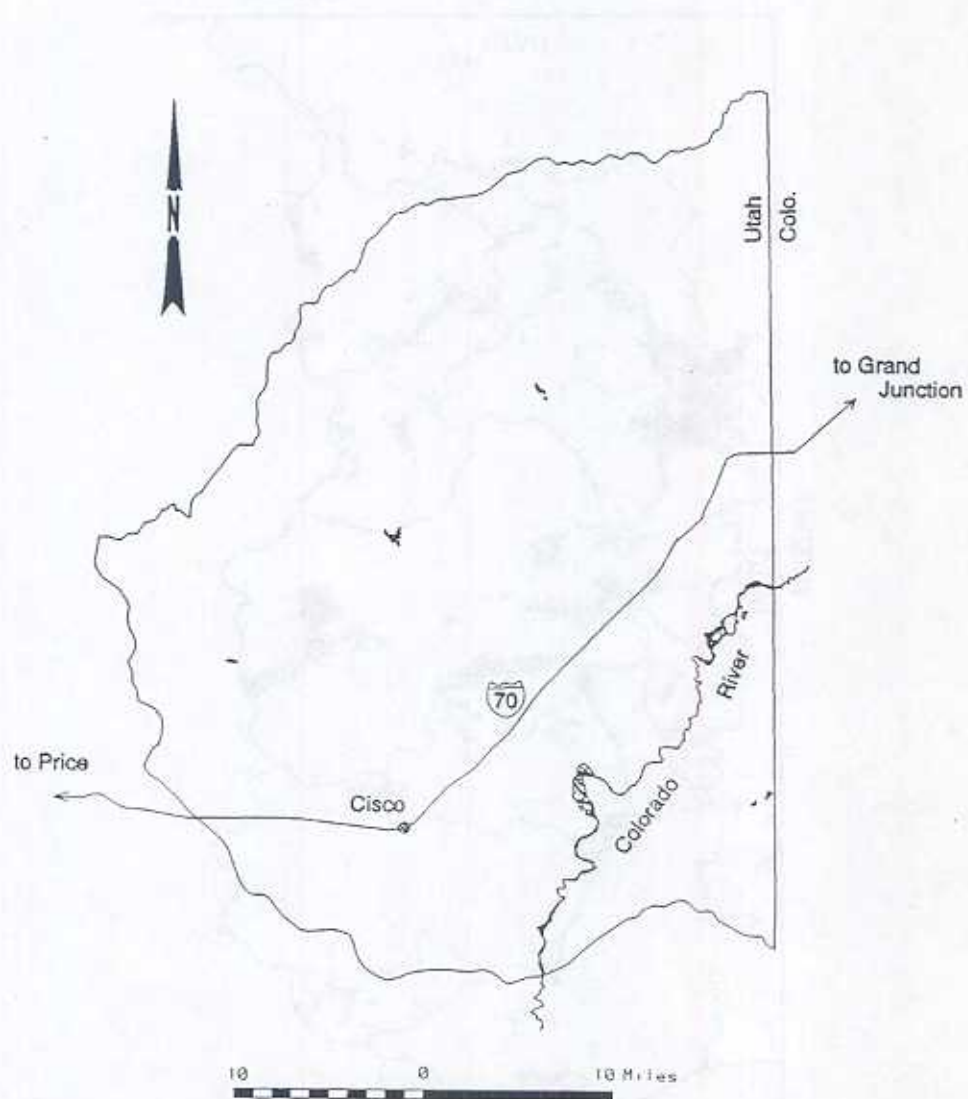


Figure 5. Water-related land use in the Cisco Subarea (9-1-1).

Land cover summary for the Dead Horse Subarea (9-1-2).
Reference Figure 6.

Code	Land Cover	Acres	County	
			Grand	San Juan
IA2a	Grain	8.4	8.4	
IA2a1	Corn	4.1	4.1	
IA2b	Vegetables	2.7	2.7	
IA3a	Alfalfa	25.9	25.9	
IA4a	Fallow	2.4	2.4	
IA4b	Idle	47.7	47.7	
IIC	Wet Flats	98.2	49.3	48.9
IIE	Riparian Areas	139.0	139.0	
IIF	Open Water	61.8	61.8	
IIF1	Streams	1,577.6	642.2	935.4
IIF4c	Evaporation Ponds	587.3	86.2	501.1
VC2	Industrial	259.1	259.1	
Total		2,814.2	1,328.8	1,485.4

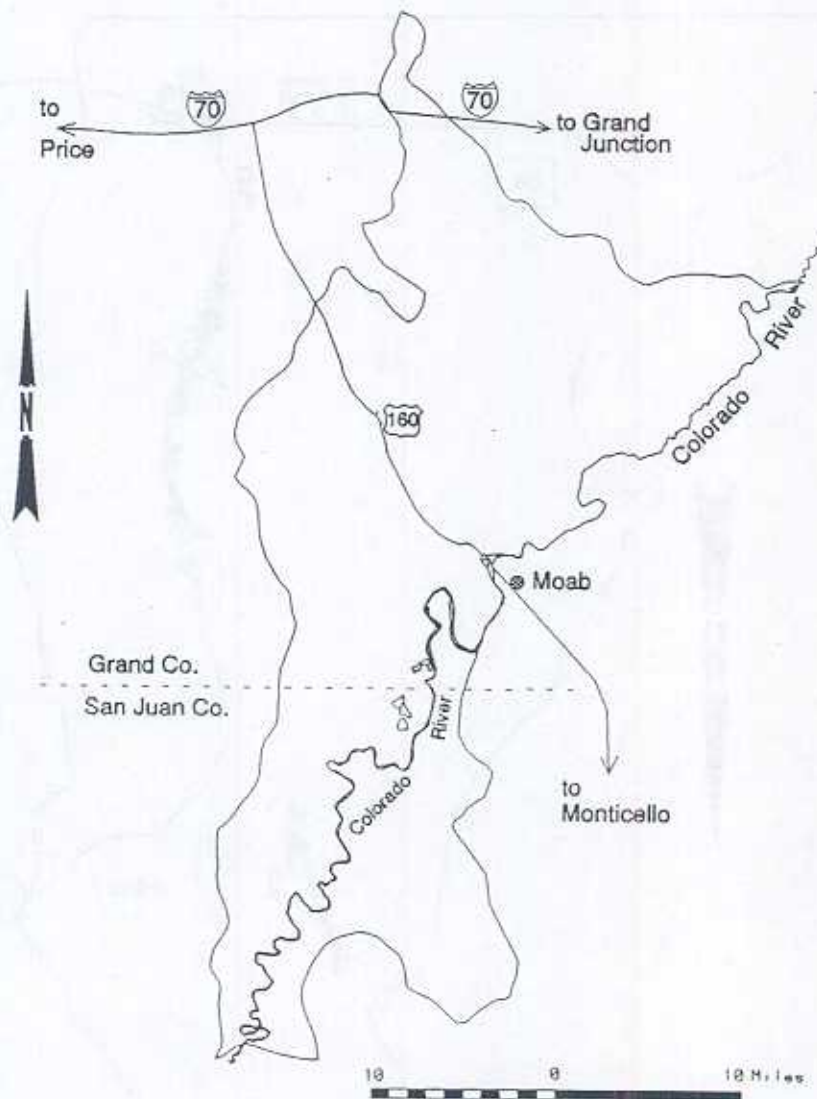


Figure 6. Water-related land use areas in the Dead Horse Subarea (9-1-2).

Land cover summary for the Castle Valley^a
Subarea (9-1-3), referenced to Figure 7.

Code	Land Cover	Acres
IA1a	Fruit	35.2
IA1c	Vineyards	10.4
IA2a1	Corn	3.2
IA3a	Alfalfa	405.2
IA3b	Grass/Hay	11.0
IA3d	Pasture	82.4
IA4a	Fallow	122.8
IA4b	Idle	54.8
IIC	Wet Flats	93.8
IIE	Riparian Areas	158.8
IIF	Open Water	5.6
IIF1	Streams	1,090.3
IVC	Excavated Lands	6.6
VA1	Bldgs/Homes (rural)	14.8
VA2	Open Spaces (feed lots, etc)	10.5
VB	Residential	246.4
VB4	Idle Space (non-irrigated)	23.6
Total		2,375.4

^aTotally within Grand County.

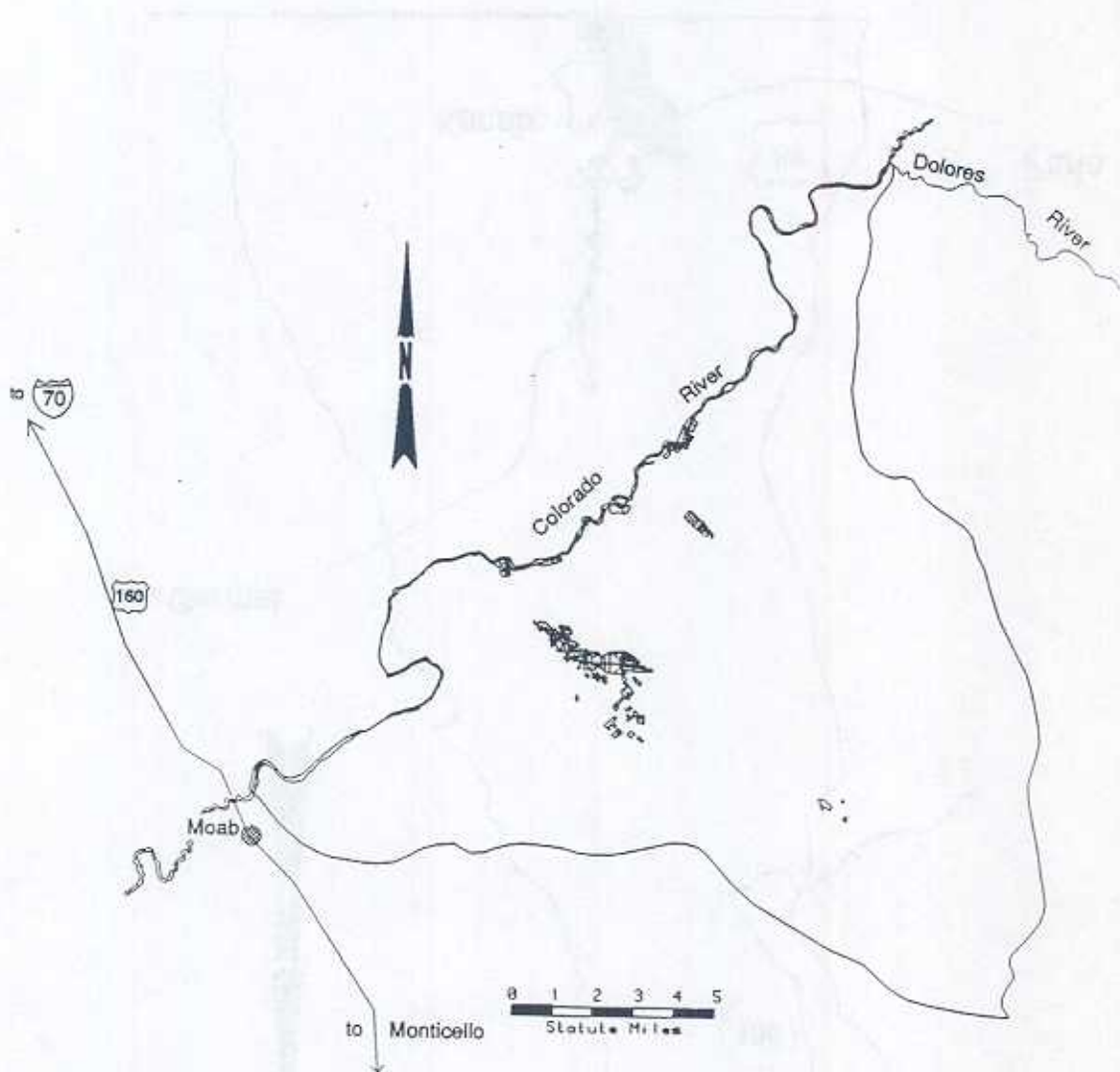


Figure 7. Water-related land use in the Castle Valley Subarea (9-1-3).

Land cover summary for the Moab Subarea (9-1-4).
Reference Figure 8.

Code	Land Cover	Acres	County	
			Grand	San Juan
IA1a	Fruit	101.1	101.1	
IA1c	Vineyards	21.4	21.4	
IA2a	Grain	2.4		2.4
IA3a	Alfalfa	1,125.1	911.8	213.3
IA3d	Pasture	334.0	278.0	56.0
IA4a	Fallow	67.6	36.2	31.4
IA4b	Idle	265.6	137.9	127.7
IB2b	Non-irrigated Pasture	421.2 ^a	421.2	
IB3b	Idle	65.6 ^a	65.6	
IIC	Wet Flats	6.4	6.4	
IIE	Riparian Areas	1,290.0	1,165.6	124.4
IIF	Open Water	100.9	36.9	64.0
IIF1	Streams	232.8	232.8	
IVC	Excavated Lands	89.6		89.6
VA1	Bldgs/Homes (rural)	12.4	12.0	0.4
VA2	Open Spaces (feed lots, etc)	15.9	15.9	
VB2	Bldgs/Homes (low density)	2,684.3	2,674.8	9.5
VB3	Open Space (parks, golf courses)	291.2	291.2	
VB4	Idle Space (non-irrigated)	250.7	250.7	
VC	Commercial/Industrial	11.4	11.4	
VC1	Commercial	8.0	8.0	
VC2	Industrial	16.4	16.4	
VC3	Open Spaces	70.7		70.7
Total		7,484.7	6,695.3	789.4

^a In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agricultural lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown for this category reflect only the number of acres mapped, not the number of acres that may be in this category in the subarea.

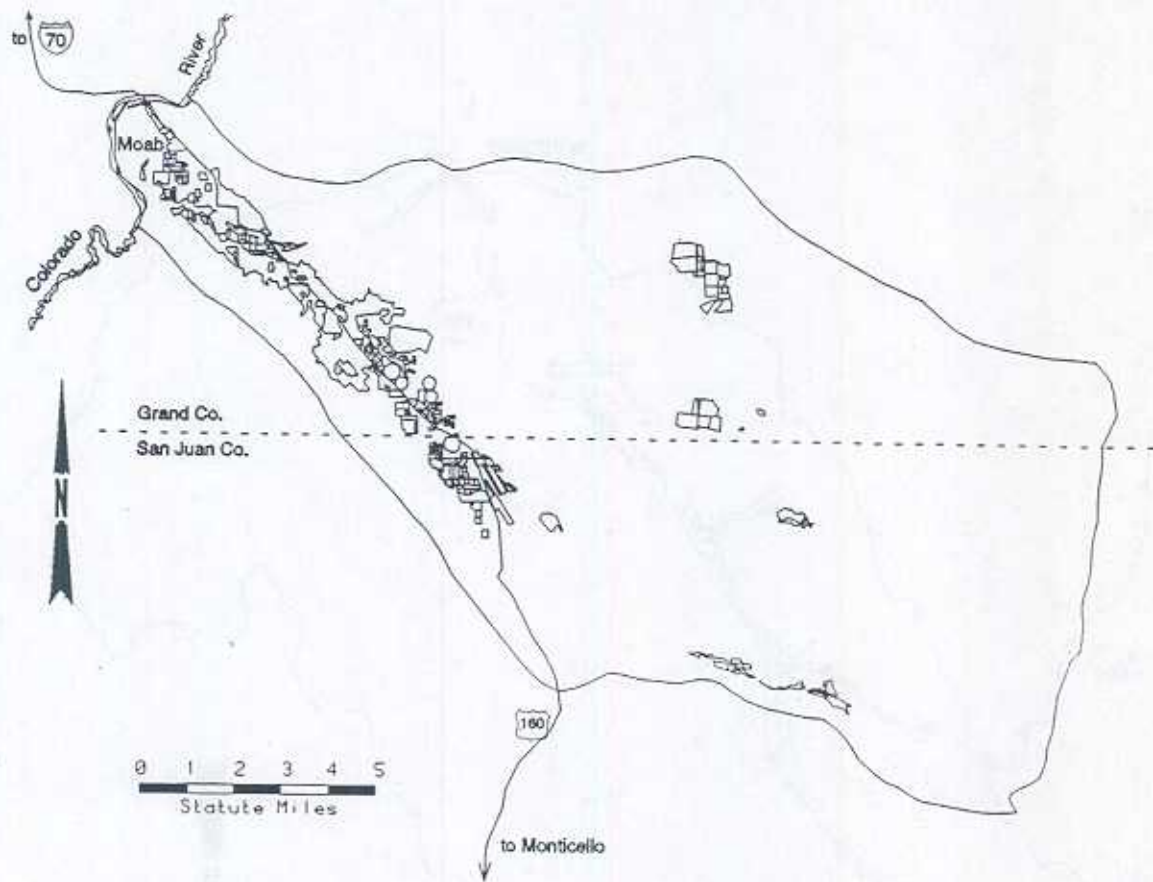


Figure 8. Water-related land use in the Moab Subarea (9-1-4).

Land cover summary for the Cane Spring Subarea (9-1-5).
Reference Figure 9.

Code	Land Cover	Acres	County	
			San Juan	Grand
IA2a	Grain	39.8	39.8	
IA3a	Alfalfa	268.6	268.6	
IA3d	Pasture	107.6	107.6	
IA4a	Fallow	40.5	40.5	
IA4b	Idle	199.5	199.5	
IB1a	Grain/Beans/Seeds	6,264.3 ^a	6,264.3	
IB1a3	Dry Beans	544.9 ^a	544.9	
IB1a4	Safflowers	1,624.0 ^a	1,624.0	
IB2a	Alfalfa	342.0 ^a	342.0	
IB3a	Fallow	4,337.7 ^a	4,337.7	
IB3b	Idle	8,938.4 ^a	8,938.4	
IIA2a	Sub-irrigated Pasture	9.1	9.1	
IIC	Wet Flats	6.6		6.6
IIE	Riparian Areas	351.9	351.9	
IIF	Open Water	126.1	126.1	
IIF1	Streams	181.2		181.2
IVC	Excavated Lands	349.3	349.3	
VA1	Bldgs/Homes (rural)	62.0	62.0	
VA2	Open Spaces (feed lots, etc)	3.1	3.1	
VB2	Bldgs/Homes (low density)	171.9	171.9	
VB3	Open Space (parks, golf courses)	0.8	0.8	
VC	Commercial/Industrial	11.8	11.8	
VC1	Commercial	2.3	2.3	
Total		23,983.4	23,795.6	187.8

^a In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agricultural lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown for this category reflect only the number of acres mapped, not the number of acres that may be in this category in the subarea.

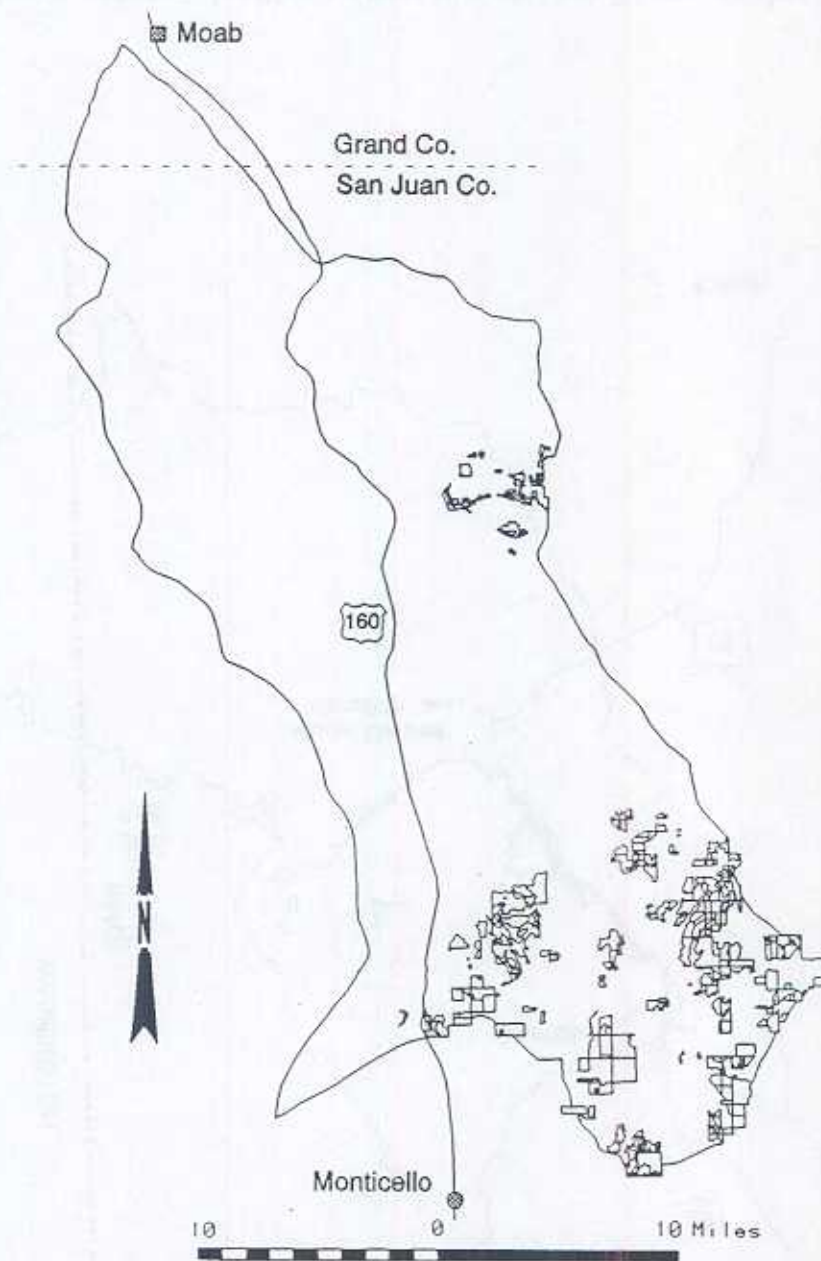


Figure 9. Water-related land use in the Cane Spring Subarea (9-1-5).

Land cover summary for the Cottonwood Creek
Subarea^a (9-1-6), referenced to Figure 10.

Code	Land Cover	Acres
At the time this survey was conducted, there was no water-related land use in this subarea.		
Total		0

^a Totally within San Juan County.

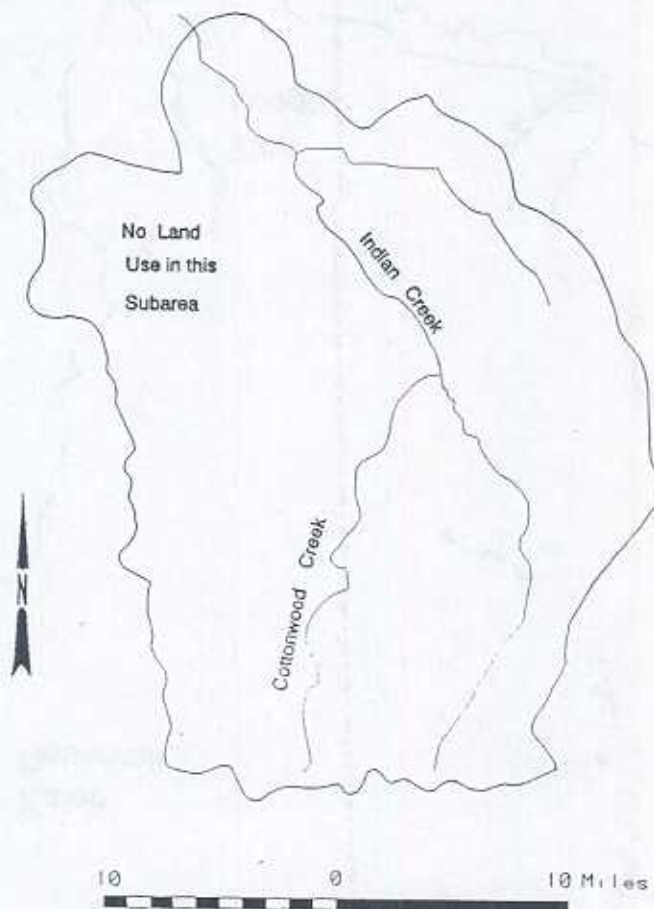


Figure 10. Water-related land use in the Cottonwood Creek Subarea (9-1-6).

Land cover summary for the LaSal Subarea^a
(9-2-1), referenced to Figure 11.

Code	Land Cover	Acres
IA2a1	Corn	42.6
IA3a	Alfalfa	102.2
IA3b	Grass/Hay	5.6
IA3d	Pasture	361.4
IA4b	Idle	120.2
IIE	Riparian Areas	43.1
IIF	Open Water	58.5
IIF1	Streams	3.8
VA2	Open Spaces (feed lots, etc)	11.2
Total		748.6

^a All water-related land use in this subarea is located within Grand County.

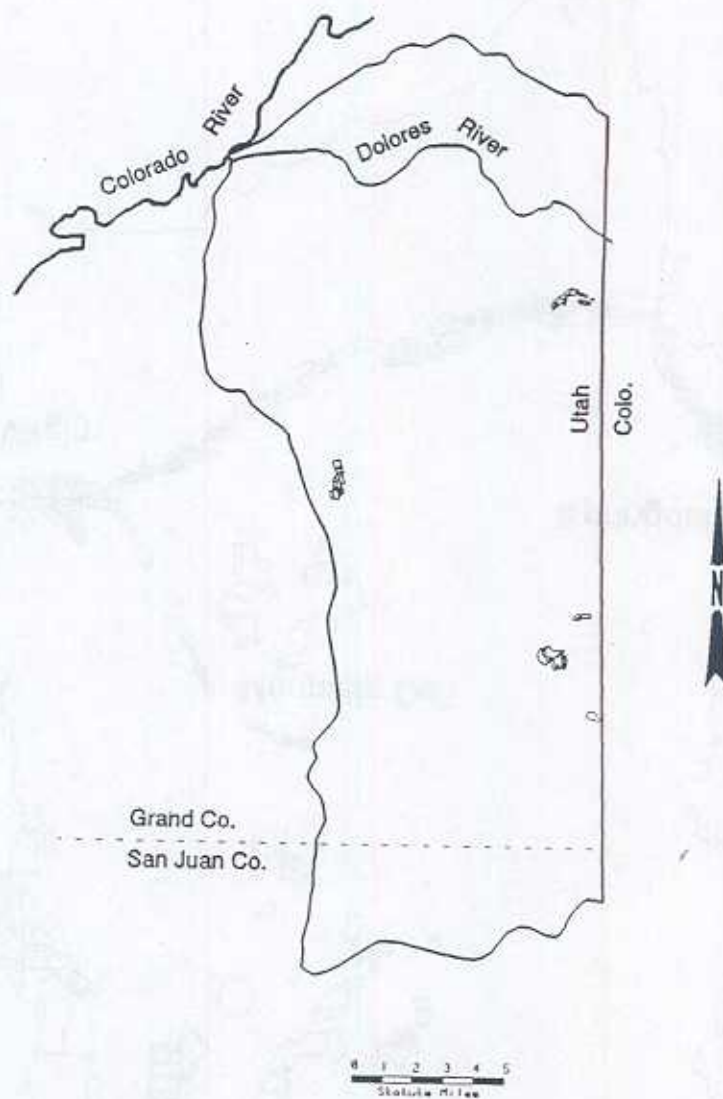


Figure 11. Water-related land use in the LaSal Subarea (9-2-1).

Land cover summary for the Lisbon Valley
Subarea^a (9-2-2), referenced to Figure 12.

Code	Land Cover	Acres
IA2a	Grain	1.9
IA3a	Alfalfa	576.3
IA3d	Pasture	277.1
IA4a	Fallow	176.5
IA4b	Idle	685.2
IB1a	Grain/Beans/Seeds	210.7 ^b
IB3a	Fallow	427.7 ^b
IB3b	Idle	214.5 ^b
IIC	Wet Flats	13.3
IIE	Riparian Areas	193.2
IIF	Open Water	26.0
IVC	Excavated Lands	17.3
VB2	Bldgs/Homes (low density)	166.0
VC	Commercial/Industrial	15.4
VC3	Comm/Ind. Open Space	12.6
Total		3,013.7

^a Totally within San Juan County.

^b In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agricultural lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown for this category reflect only the number of acres mapped, not the number of acres that may be in this category in the subarea.

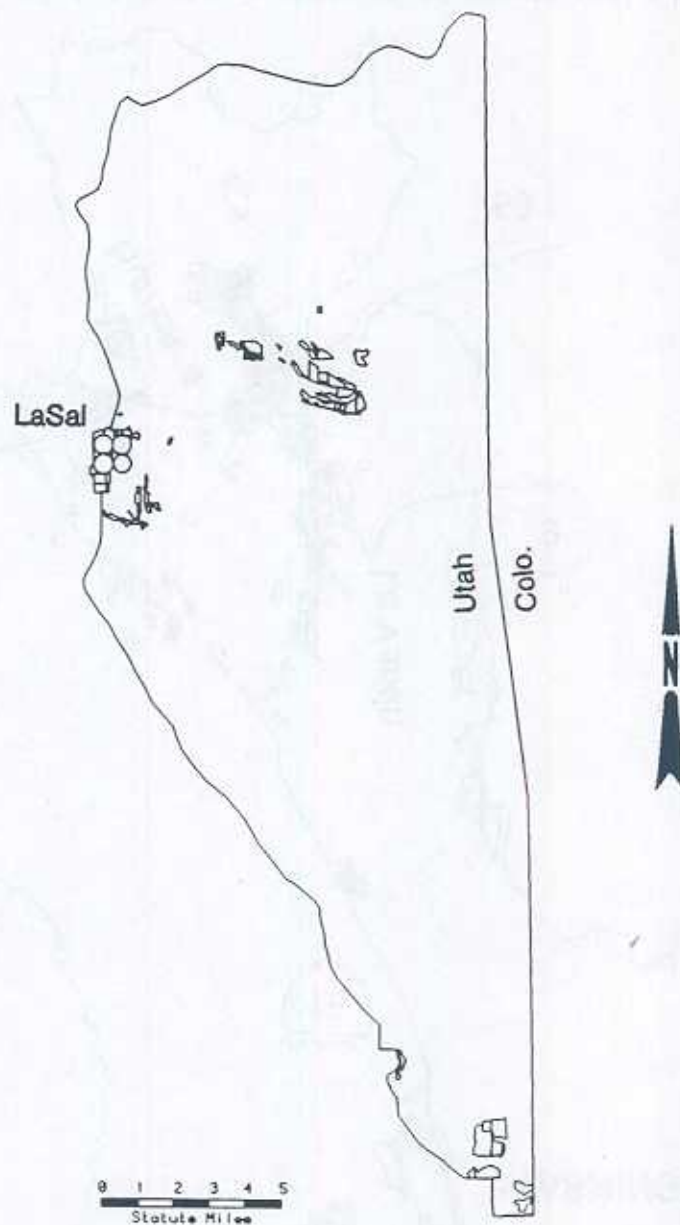


Figure 12. Water-related land use in the Lisbon Valley Subarea (9-2-2).

Land cover summary for the Summit Canyon
Subarea^a (9-2-3), referenced to Figure 13.

Code	Land Cover	Acres
IB1a	Grain/Beans/Seeds	909.7 ^b
IB1a4	Safflowers	207.4 ^b
IB3a	Fallow	641.8 ^b
IB3b	Idle	188.5 ^b
IVC	Excavated Lands	26.8
VA1	Bldgs/Homes (rural)	0.7
VC	Commercial/Industrial	7.0
Total		1,981.9

^a Totally within San Juan County.

^b In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agricultural lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown for this category reflect only the number of acres mapped, not the number of acres that may be in this category in the subarea.

The land use shown
in this subarea consists
only of non-irrigated
dry-farm crops.

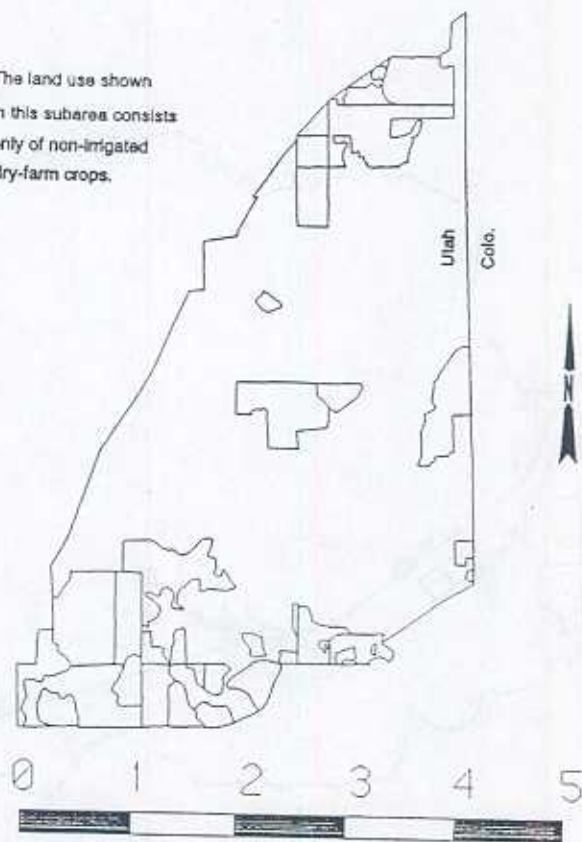


Figure 13. Water-related land use in the Summit Canyon Subarea (9-2-3).

Land cover summary for the San Juan Subarea^a
(9-3-1), referenced to Figure 14.

Code	Land Cover	Acres
IA4b	Idle	562.9
IIC	Wet Flats	1,180.4
IIE	Riparian Areas	636.7
IIF	Open Water	3.9
IIF1	Streams	1,423.4
IIF2	Reservoirs	18,139.6 ^b
IIF4b	Sewage Lagoon	13.2
IIF4c	Evaporation Ponds	87.5
VB2	Bldgs/Homes (low density)	143.3
VB3	Open Space (parks, golf courses)	3.5
VB4	Idle Space (non-irrigated)	2.6
VC	Commercial/Industrial	150.4
Total		22,347.4

^aTotally within San Juan County.

^bThis represents approximately one-half the river surface area bordering this subarea.

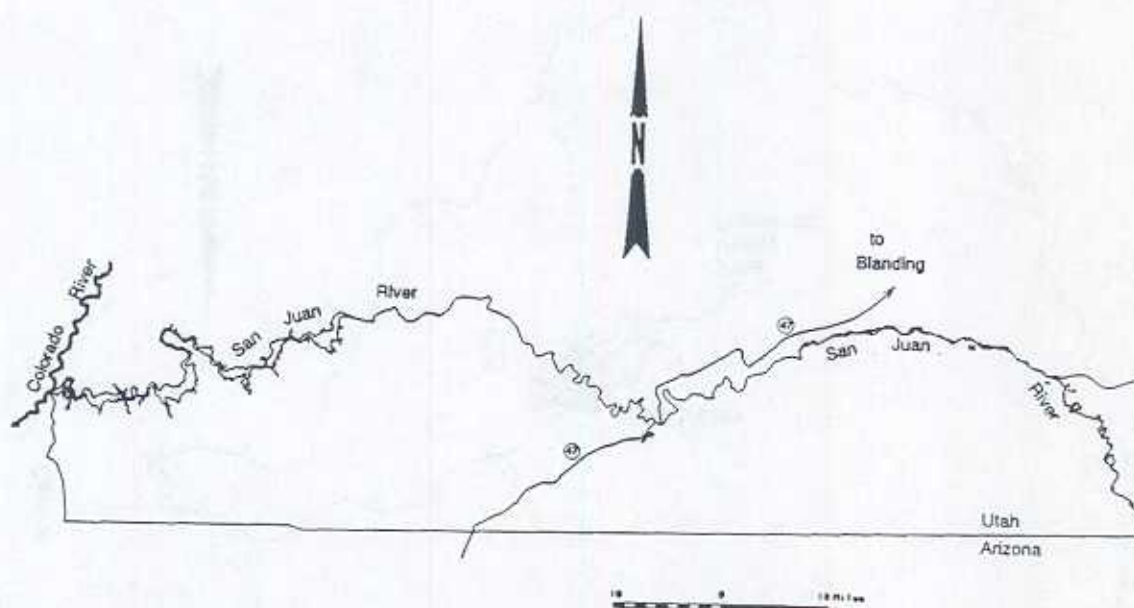


Figure 14. Water-related land use in the San Juan Subarea (9-3-1).

Land cover summary for the Grand Gulch Subarea^a
(9-3-2), referenced to Figure 15.

Code	Land Cover	Acres
IIF2	Reservoirs	116.1
IIF4b	Sewage Lagoon	2.7
VB2	Bldgs/Homes (low density)	25.1
VC	Commercial/Industrial	5.7
Total		149.6

^a All water-related land use in this subarea is located within San Juan County.

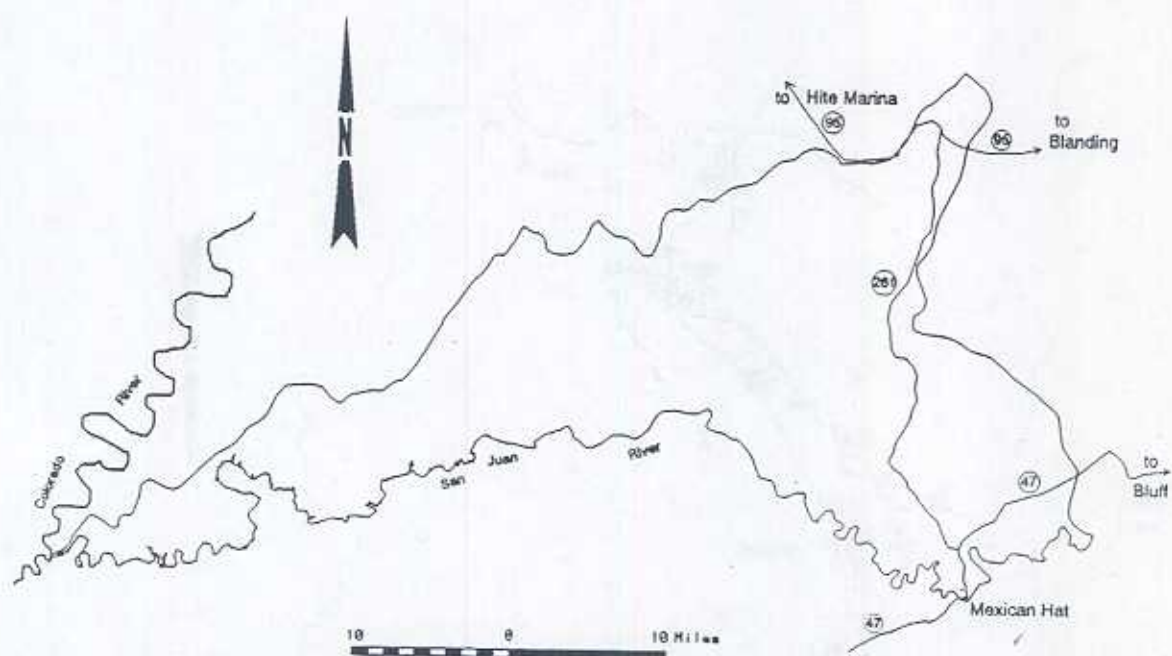


Figure 15. Water-related land use in the Grand Gulch Subarea (9-3-2).

Land cover summary for the Blanding Subarea^a
(9-3-3), referenced to Figure 16.

Code	Land Cover	Acres
IA1a	Fruit	21.1
IA2a	Grain	166.2
IA2b	Vegetables	9.6
IA3a	Alfalfa	1,477.0
IA3b	Grass/Hay	439.6
IA3d	Pasture	774.1
IA4a	Fallow	539.5
IA4b	Idle	628.3
IB1a	Grain/Beans/Seeds	716.7 ^b
IB2a	Alfalfa	142.6 ^b
IB2b	Non-irrigated Pasture	583.4 ^b
IB3a	Non-irrigated Fallow	724.4 ^b
IB3b	Idle	1,603.5 ^b
IIE	Riparian Areas	1,329.8
IIF	Open Water	217.0
IIF1	Streams	3.3
IIF2	Reservoirs	37.1
IIF3	Ponds & Lakes	35.9
IIF4b	Sewage Lagoon	42.6
IVC	Excavated Lands	505.6
VA	Farmsteads	5.4
VA1	Bldgs/Homes (rural)	46.8
VA2	Open Spaces (feed lots, etc)	38.0
VB2	Bldgs/Homes (low density)	1,355.8
VB3	Open Space (parks, golf courses)	64.0
VB4	Idle Space (non-irrigated)	72.4
VC	Commercial/Industrial	134.9
VC2	Industrial	69.2
VC3	Comm/Indust. Open Spaces	69.5
Total		11,853.3

^aTotally within San Juan County.

^bIn conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agricultural lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown for this category reflect only the number of acres mapped, not the number of acres that may be in this category in the subarea.

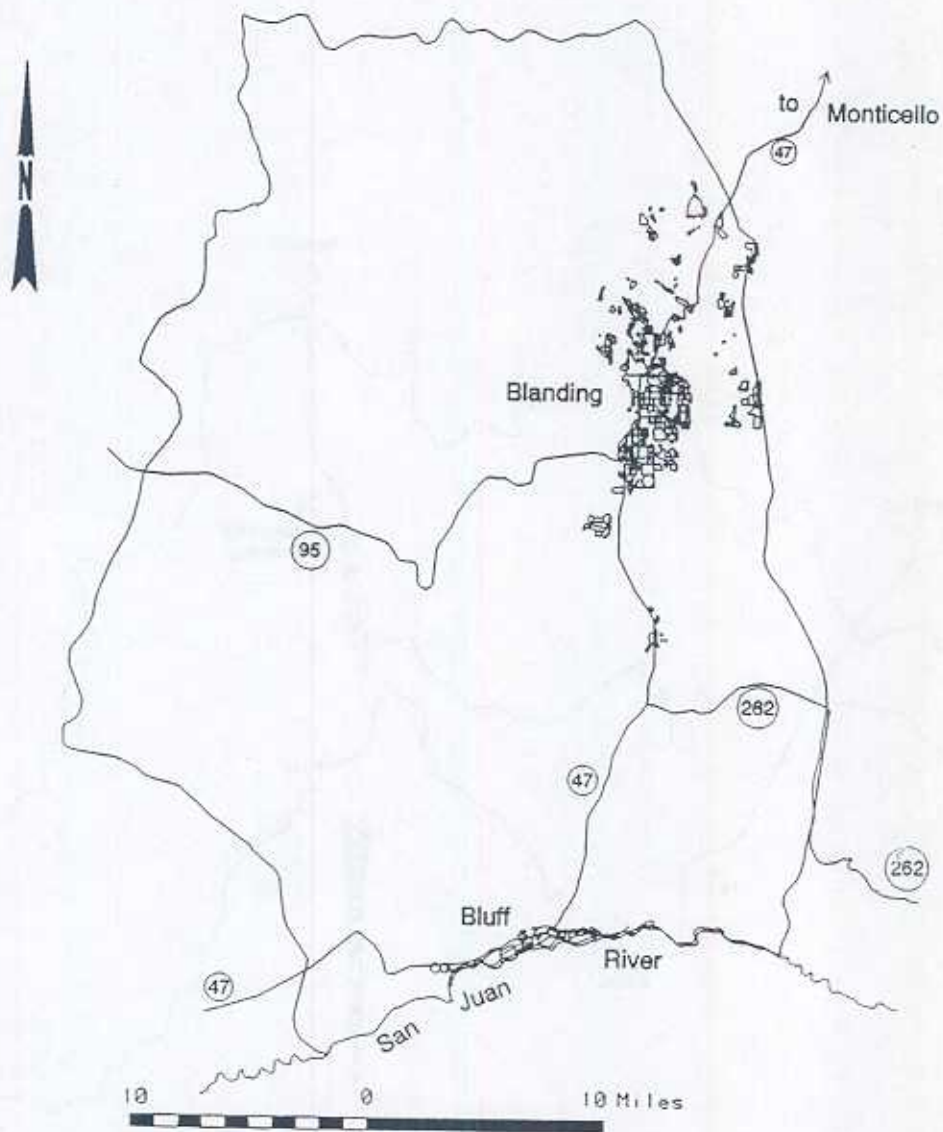


Figure 16. Water-related land use in the Blanding Subarea (9-3-3).

Land cover summary for the Monticello Subarea^a
(9-3-4), referenced to Figure 17.

Code	Land Cover	Acres
IA1a	Fruit	34.4
IA1c	Vineyards	27.1
IA2a	Grain	167.8
IA3a	Alfalfa	544.2
IA3b	Grass/Hay	14.0
IA3d	Irrigated Pasture	761.4
IA4a	Fallow	124.3
IA4b	Idle	209.0
IB1a	Grain/Beans/Seeds	21,109.6 ^b
IB1a3	Dry Grain	7,292.8 ^b
IB1a4	Safflowers	4,423.9 ^b
IB2a	Alfalfa	3,032.8 ^b
IB2b	Non-irrigated Pasture	356.1 ^b
IB3a	Non-irrigated Fallow	22,069.6 ^b
IB3b	Idle	19,355.5 ^b
IIA1a	Grass/Hay(subject to spr. floodg)	157.6
IIB	Cattail/Bullrush Aspect	26.6
IIE	Riparian Areas	302.1
IIF	Open Water	139.4
IIF1	Streams	0.2
IIF4b	Sewage Lagoon	51.4
IVC	Excavated Lands	70.3
VA	Farmsteads	2.8
VA1	Bldgs/Homes (rural)	254.4
VA2	Open Spaces (feed lots, etc)	74.3
VB2	Bldgs/Homes (low density)	678.8
VB3	Open Space (parks, golf courses)	88.7
VC	Commercial/Industrial	134.6
VC1	Commercial	83.0
VC2	Industrial	8.6
VC3	Comm/Indust. Open Spaces	73.8
Total		81,669.2

^a Totally within San Juan County.

^b In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agricultural lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown for this category reflect only the number of acres mapped, not the number of acres that may be in this category in the subarea.

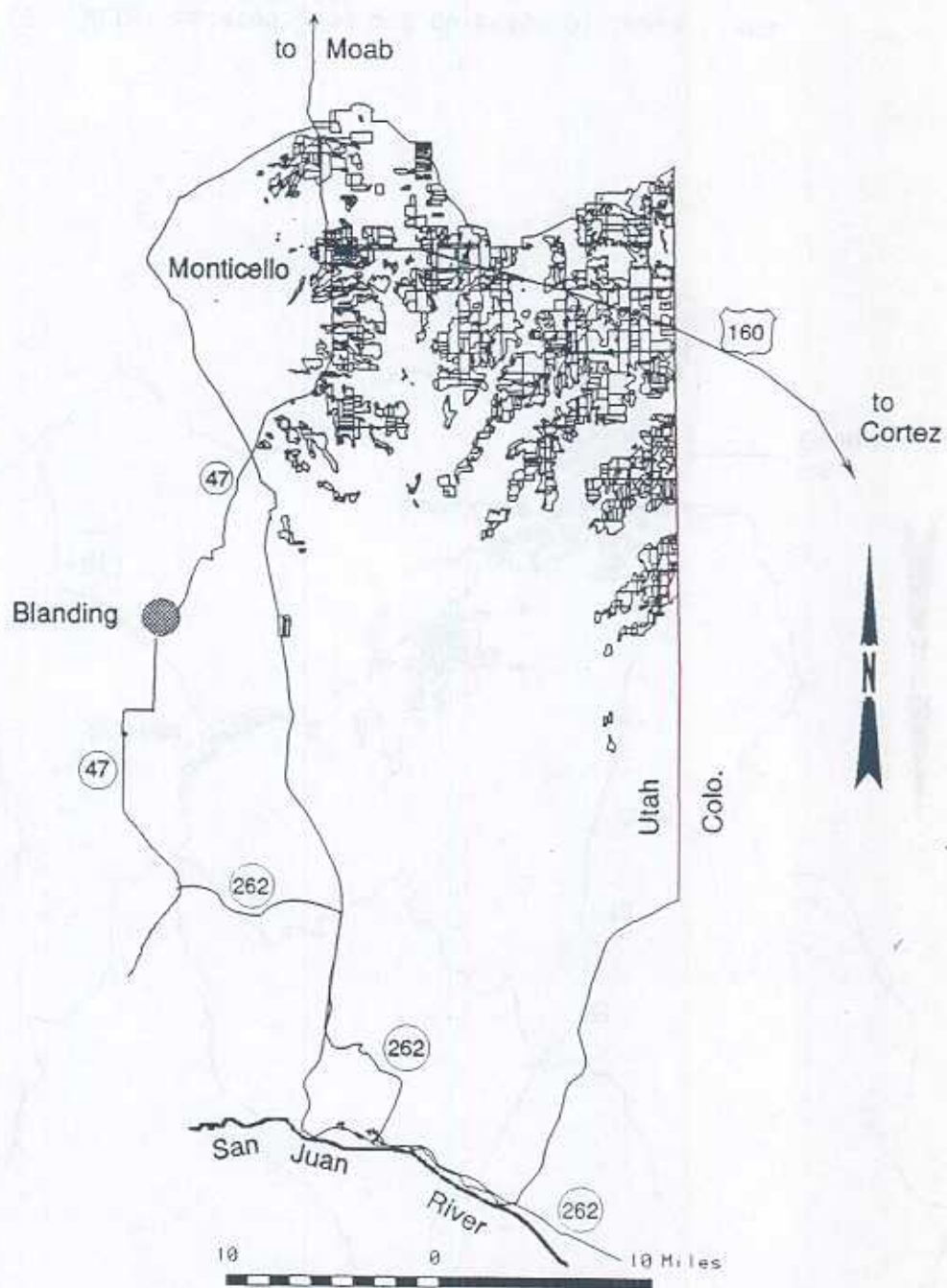


Figure 17. Water-related land use in the Monticello Subarea (9-3-4).

Land cover summary for the McElmo Subarea^a
(9-3-5), referenced to Figure 18.

Code	Land Cover	Acres
At the time this survey was conducted, there was no water-related land use in this subarea.		
Total		0

^aTotally within San Juan County.

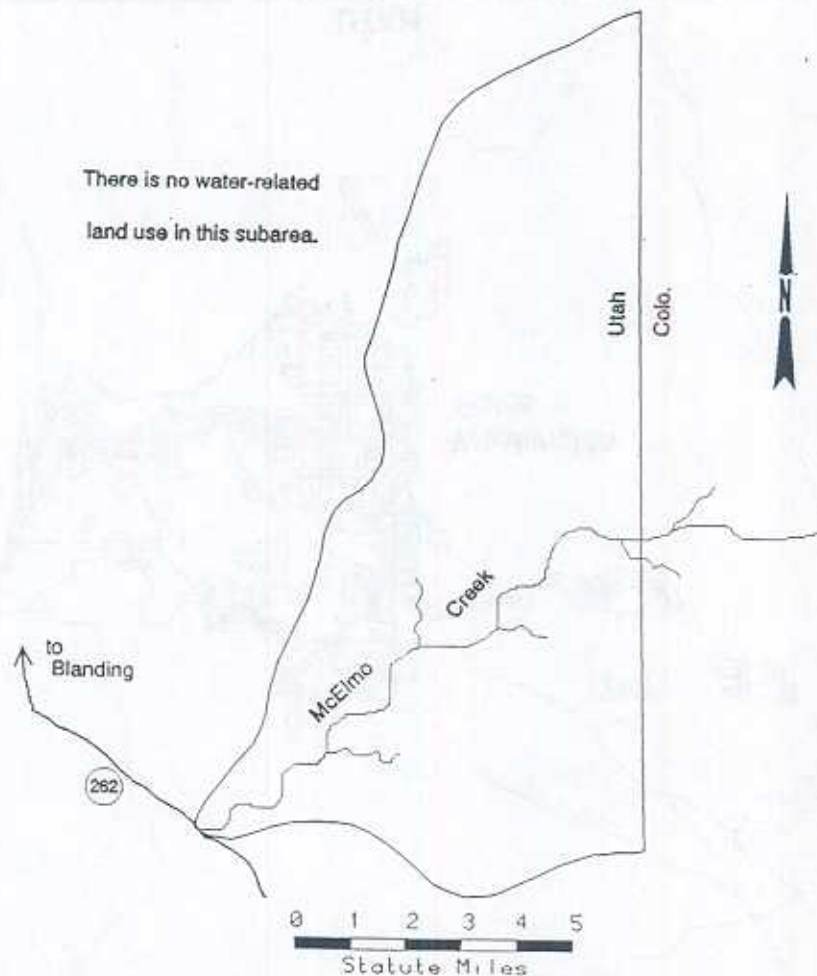


Figure 18. Water-related land use in the McElmo Subarea (9-3-5).

Land cover summary for the Wahweap Study Area (9-4).
Reference Figure 19.

Code	Land Cover	Acres	County	
			Kane	San Juan
IIE	Riparian Areas	22.8	22.8	
IIF	Open Water	9.6	9.6	
IIF2	Reservoirs ^a	67,361.8 ^b	53,298.4	14,063.4
IVC	Excavated Lands	52.9	52.9	
VB2	Bldgs/Homes (low density)	64.8	64.8	
VC1	Commercial	13.8	13.8	
Total		67,525.7	53,462.3	14,063.4

^a This includes Lake Powell and Glen Canyon which are located almost entirely in this study area.

^b Water surface area of Lake Powell, Glen Canyon, and the Colorado River within this study area.

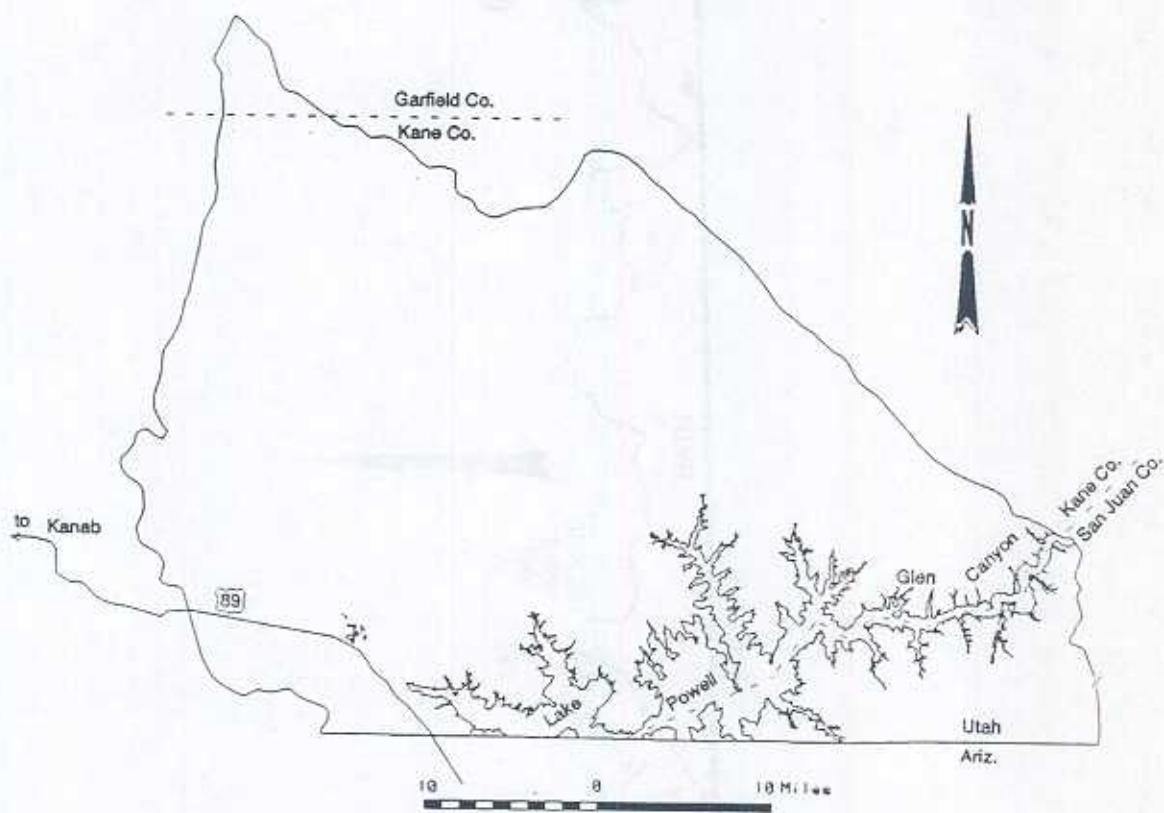


Figure 19. Water-related land use in the Wahweep Study Area (9-4).

Land cover summary for the Paria Study Area (9-5).
Reference Figure 20.

Code	Land Cover	Acres	County	
			Garfield	Kane
IA1a	Fruit	26.5	26.5	
IA1f	Other Horticulture	9.0	9.0	
IA2a	Grain	200.1	180.3	19.8
IA3a	Alfalfa	1,387.9	1,354.6	33.3
IA3b	Grass/Hay	54.8	54.8	
IA3d	Pasture	564.0	564.0	
IA4a	Fallow	139.0	139.0	
IA4b	Idle	413.2	413.2	
IB2b	Non-irrigated Pasture	127.6 ^a	127.6	
IB3b	Idle	23.9 ^a	23.9	
IIB	Cattail/Bullrush Aspect	113.2		113.2
IIE	Riparian Areas	600.9	441.3	159.6
IIF	Open Water	15.6	15.6	
IIF2	Reservoirs	42.1	42.1	
VA2	Open Spaces (feed lots, etc)	24.8	24.8	
VB2	Bldgs/Homes (low density)	404.0	404.0	
VB3	Open Space (parks, golf courses)	14.7	14.7	
Total		4,161.2	3,835.3	325.9

^a In conducting water-related land use inventories, the division attempts to inventory all lands or areas that consume or evaporate water other than natural precipitation. Non-irrigated agricultural lands are generally mapped if they fall within or border irrigated lands. Non-irrigated lands away from irrigated lands are normally not mapped. Acres shown for this category reflect only the number of acres mapped, not the number of acres that may be in this category in the subarea.

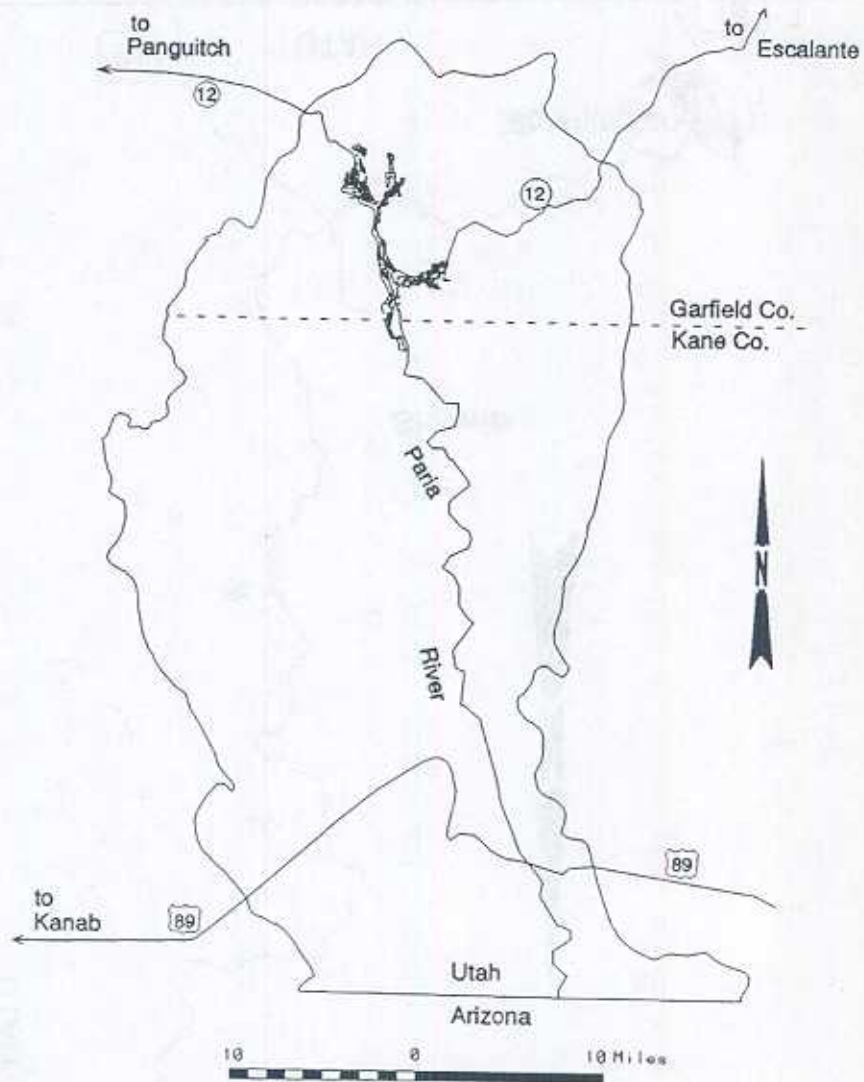


Figure 20. Water-related land use in the Paria Study Area (9-5).

The water-related land use data for the Southeast Colorado River Basin has been displayed by study/subarea in Figures 5 through 20. It has also been tabulated by study/subarea and by county in Tables 2 and 3, respectively.

The division inventoried over 233,346 acres of land in the Southeast Colorado River Basin drainage. This represents about 3.4 percent of the entire Southeast Colorado River Basin drainage area (approximately 6,960,990 acres). Areas not inventoried are mainly national forests and rangeland. Of the 233,353 inventoried acres, 16,122 are irrigated pasture and cropland, 100,630 are wet/open water areas (including reservoirs), and 7,956 are residential/industrial areas (including farmsteads and rural housing). Dry-land agriculture (grain, beans, seeds, safflowers, etc.) is of particular significance to this area of the state, and the division mapped 106,901 acres under dry-land agriculture in the Southeast Colorado River Basin. Again, this reflects only the number of acres mapped, not the total number of acres that may be in this category in the basin. Non-irrigated lands away from irrigated lands are normally not mapped, and non-irrigated agricultural lands are mapped only if they fall within, or border, irrigated lands.

Table 2. Summary of land cover (in acres) by Study/Subarea for the Southeast Colorado River Basin.

Code	Cover	Cisco (9-1-1)	Dead Horse (9-1-2)	Castle V. (9-1-3)	Moab (9-1-4)	Cane Spr. (9-1-5)	Cottonwood Cr. (9-1-6)	LaSal (9-2-1)	Lisbon V. (9-2-2)	Summit Canyon (9-2-3)
IA1a	Orchard	0	0	35	101	0	0	0	0	0
IA1c	Vineyards & Other Horticulture	0	0	10	21	0	0	0	0	0
IA2a	Grain	25	8	0	2	40	0	0	2	0
IA2a1	Corn	0	4	3	0	0	0	43	0	0
IA2b	Vegetables	0	3	0	0	0	0	0	0	0
IA3a	Alfalfa	212	26	405	1,125	268	0	102	576	0
IA3b	Grass/Hay	26	0	11	0	0	0	6	0	0
IA3d	Pasture	110	0	82	334	108	0	361	277	0
IA4a	Fallow	42	2	123	68	40	0	0	176	0
IA4b	Idle	510	48	55	266	200	0	120	685	0
IIA1a	Pasture (subject to spring flooding)	0	0	0	0	0	0	0	0	0
Surface Irrigated Cropland Subtotal		925	91	724	1,917	656	0	632	1,716	0
IIA2a	Sub-irrigated Pasture	0	0	0	0	9	0	0	0	0
IIA2b	Sub-irrigated Grass/Hay	0	0	0	0	0	0	0	0	0
Sub-irrigated Cropland Subtotal		0	0	0	0	9	0	0	0	0
Total Irrigated Croplands		925	91	724	1,917	665	0	632	1,716	0
IIc	Wet Flats (cattails/bullrush, etc)	174	98	94	6	7	0	0	13	0
IIe	Riparian Areas	905	139	159	1,290	352	0	43	193	0
IIF	Open Water	2	62	6	101	126	0	58	26	0
IIF1	Streams	1,147	1,578	1,090	233	181	0	4	0	0
IIF2	Reservoirs	0	0	0	0	0	0	0	0	0
IIF4b	Sewage Lagoon	0	0	0	0	0	0	0	0	0
IIF4c	Evaporation Ponds	0	587	0	0	0	0	0	0	0
Wet/Open Water Areas Subtotal		2,228	2,464	1,349	1,630	566	0	105	232	0
VA1	Bldgs/Homes (rural)	26	0	15	12	62	0	0	0	0
VA2	Open Spaces (feed lots, etc)	19	0	11	16	3	0	11	0	0
VB	Residential	0	0	246	2,684	172	0	0	166	1
VB3	Irr. Open Space (parks, golf courses)	0	0	0	291	1	0	0	0	0
VC	Commercial/Industrial	0	0	0	11	12	0	0	15	7
VC1	Commercial	0	0	0	8	2	0	0	0	0
VC2	Industrial	0	259	0	16	0	0	0	0	0
Residential/Industrial Subtotal		45	259	272	3,038	252	0	11	181	8
Land Use/Land Cover Totals		3,198	2,814	2,345	6,585	1,583	0	748	2,129	8

Table 2. Continued.

Code	Cover	Study/Subareas					Total
		San Juan (9-3-1)	Grand Gulch (9-3-2)	Blanding (9-3-3)	Monticello (9-3-4)	McElmo (9-3-5)	
IA1a	Orchard	0	0	21	34	0	217
IA1c	Vineyards & Other Horticulture	0	0	0	27	0	67
IA2a	Grain	0	0	166	168	0	511
IA2a1	Corn	0	0	0	0	0	50
IA2b	Vegetables	0	0	10	0	0	13
IA3a	Alfalfa	0	0	1,477	544	0	6,123
IA3b	Grass/Hay	0	0	440	14	0	552
IA3d	Pasture	0	0	774	761	0	3,371
IA4a	Fallow	0	0	540	124	0	1,254
IA4b	Idle	563	0	628	209	0	3,697
IIA1a	Pasture (subject to spring flooding)	0	0	0	158	0	158
Surface Irrigated Cropland Subtotal		563	0	4,056	2,039	0	16,113
IIA2a	Sub-irrigated Pasture	0	0	0	0	0	9
IIA2b	Sub-irrigated Grass/Hay	0	0	0	0	0	0
Sub-irrigated Cropland Subtotal		0	0	0	0	0	9
Total Irrigated Croplands		563	0	4,056	2,039	0	16,122
IIIC	Wet Flats (cattails/bullrush, etc)	1,180	0	0	27	0	1,712
IIIE	Riparian Areas	637	0	1,330	302	0	5,974
IIIF	Open Water	4	0	253	139	0	803
IIIF1	Streams	1,423	0	3	0	0	5,859
IIIF2	Reservoirs	18,140	116	37	0	0	85,897
IIIF4b	Sewage Lagoon	13	3	42	51	0	110
IIIF4c	Evaporation Ponds	88	0	0	0	0	675
Wet/Open Water Areas Subtotal		21,485	119	1,665	519	0	100,630
VA1	Bldgs/Homes (rural)	0	0	52	257	0	424
VA2	Open Spaces (feed lots, etc)	0	0	38	74	0	197
VB	Residential	143	25	1,356	679	0	5,940
VB3	Irr. Open Space (parks, golf courses)	4	0	64	89	0	464
VC	Commercial/Industrial	150	6	135	135	0	471
VC1	Commercial	0	0	0	83	0	107
VC2	Industrial	0	0	69	9	0	353
Residential/Industrial Subtotal		297	31	1,714	1,326	0	7,956
Land Use/Land Cover Totals		22,345	150	7,435	3,884	0	124,708

Table 3. Summary of land cover (in acres) by County for the Southeast Colorado River Basin.

Code	Cover	San Juan	Kane	County	Grand	Garfield	Total
IA1a	Orchard	55	0	136	26	217	
IA1c	Vineyards & Other Horticulture	27	0	31	9	67	
IA2a	Grain	378	20	33	180	611	
IA2a1	Corn	0	0	50	0	50	
IA2b	Vegetables	10	0	3	0	13	
IA3a	Alfalfa	3,079	33	1,657	1,354	6,123	
IA3b	Grass/Hay	454	0	43	55	552	
IA3d	Pasture	1,976	0	831	564	3,371	
IA4a	Fallow	912	0	203	139	1,254	
IA4b	Idle	2,412	0	872	413	3,697	
IIA1a	Pasture (subject to spring flooding)	158	0	0	0	158	
Surface Irrigated Cropland Subtotal		9,461	53	3,859	2,740	16,113	
IIA2a	Sub-irrigated Pasture	9	0	0	0	9	
IIA2b	Sub-irrigated Grass/Hay	0	0	0	0	0	
Sub-irrigated Cropland Subtotal		9	0	0	0	9	
Total Irrigated Croplands		9,470	53	3,859	2,740	16,122	
IIIC	Wet Flats (cattails/bullrush, etc)	1,269	113	330	0	1,712	
IIIE	Riparian Areas	2,938	182	2,412	442	5,974	
IIIF	Open Water	613	10	164	16	803	
IIIF1	Streams	2,362	0	3,297	0	5,659	
IIIF2	Reservoirs	32,357	53,298	0	42	85,697	
IIIF4b	Sewage Lagoon	110	0	0	0	110	
IIIF4c	Evaporation Ponds	588	0	86	0	675	
Wet/Open Water Areas Subtotal		40,238	53,603	6,289	500	100,630	
VA1	Bldgs/Homes (rural)	372	0	52	0	424	
VA2	Open Spaces (feed lots, etc)	115	0	57	25	197	
VB	Residential	2,550	65	2,921	404	5,940	
VB3	Irr. Open Space (parks, golf courses)	157	0	292	15	464	
VC	Commercial/Industrial	460	0	11	0	471	
VC1	Commercial	85	14	8	0	107	
VC2	Industrial	78	0	275	0	353	
Residential/Industrial Subtotal		3,817	79	3,616	444	7,956	
Land Use/Land Cover Totals		53,525	53,735	13,764	3,684	124,708	

METHODOLOGY FOR GATHERING LAND USE DATA

Background

The methodology used by the division over the past 25 years in conducting water-related land use studies has varied with regard to the procedures used, detail, etc. Earlier inventories were prepared with large format vertical-aerial photographs supplemented with field surveys to label boundaries, vegetation types, and other water use information.

After identifying crops and labeling photographs, the photographs were projected onto a base map and then planimetered or "dot-counted" to determine the acreage. Tables for individual townships and ranges were prepared showing total land within every section and the amount of land in each land use category. Data was then available for use in preparing water budgets.

The water-related land use inventories completed by the division and the U.S. Soil Conservation Service (SCS) over the last 25 years have essentially covered the entire state. The two agencies have inventoried about 4 million acres (including 1.4 million acres of irrigated land) in order to acquire the data needed to prepare hydrologic inventories and to conduct other water-related studies in Utah.

In the early 1980s, the division began updating its methodology for collecting water-related land use data to take advantage of the rapidly growing fields of remotely sensed data and computerized Geographic Information Systems (GIS). Updating land use data for each hydrologic area of the state is an on-going process, and the division has now developed

procedures for consistent data gathering and for updating it at 7 to 10 year intervals.

For several years, the division contracted with the University of Utah Research Institute, Center for Remote Sensing and Cartography (CRSC), to prepare water-related land use inventories. During this period, water-related land use data was obtained by using high altitude color infrared photography and laboratory interpretation, with field checking. More recently, the division has entered into cooperative agreements with several federal and other state agencies to complete and update all land use data for the state of Utah.

Present Method

In March 1984, several division staff members visited the California Department of Water Resources to observe its methodology for collecting water-related land use data for state water planning purposes. The division, based on its review of the California methodology and its own experience, developed a water-related land use inventory program. This program includes the use of 35mm slides, USGS 7½ minute quadrangle maps, field-mapping using base maps produced from the 35mm photography, and a computerized geographic information system to process, store, and retrieve land use data.

The first step in a water-related land use inventory is to identify areas to be covered with aerial photography for any individual year. These areas are identified on maps of suitable scale (usually 1:100,000) using previous land use studies and other available information such as maps generated from high altitude color infrared photography or Landsat. Flight lines are plotted on the maps show land areas to be covered with aerial

photography. Flight lines are generally plotted running north and south through the center of the sections to be photographed. An exception to the practice is a long narrow canyon with irrigated land only in the bottom. When this situation is encountered, the flight line will follow the canyon without regard to section lines or compass directions.

During the second step, identified areas are photographed using 35mm slide film. Ideally, the 35mm photography should be conducted at a time of year that shows the highest contrast between the water-related land use areas (mainly irrigated land) and surrounding areas. When field mapping/checking is to be conducted in the same season, the photographs are taken as early in the growing season as possible. The division has generally found that the period from June 15 to July 15 is the best time for this photography.

The division specifies that aerial photographs be obtained using an aircraft (Figure 21) carrying a high quality 35mm single lens reflex camera mounted to focus along a vertical axis to the earth. A 24mm lens is required and photos must be taken between 6,000 and 6,500 feet above the ground. This procedure allows each slide to cover a little more than one square mile with approximately 30 percent overlap on the wide side of the slide and 5 percent on the slide's narrow side. High quality commercial color positive film is used with appropriate commercial processing after each day's flight. The slides are then cataloged according to the flight-line number and shown on a location map. All 35mm slides are stored in files at the division offices and are cataloged according to individual quadrangle map location.

After cataloging the slides, the division transfers boundaries of water-related areas from the slide to USGS 7½ minute quadrangle maps using a standard slide projector with a 100-200mm zoom lens. The image is directed

from the projector, located below a glass table top, to a 45 degree first surface mirror to the back of a quadrangle map. The image showing through

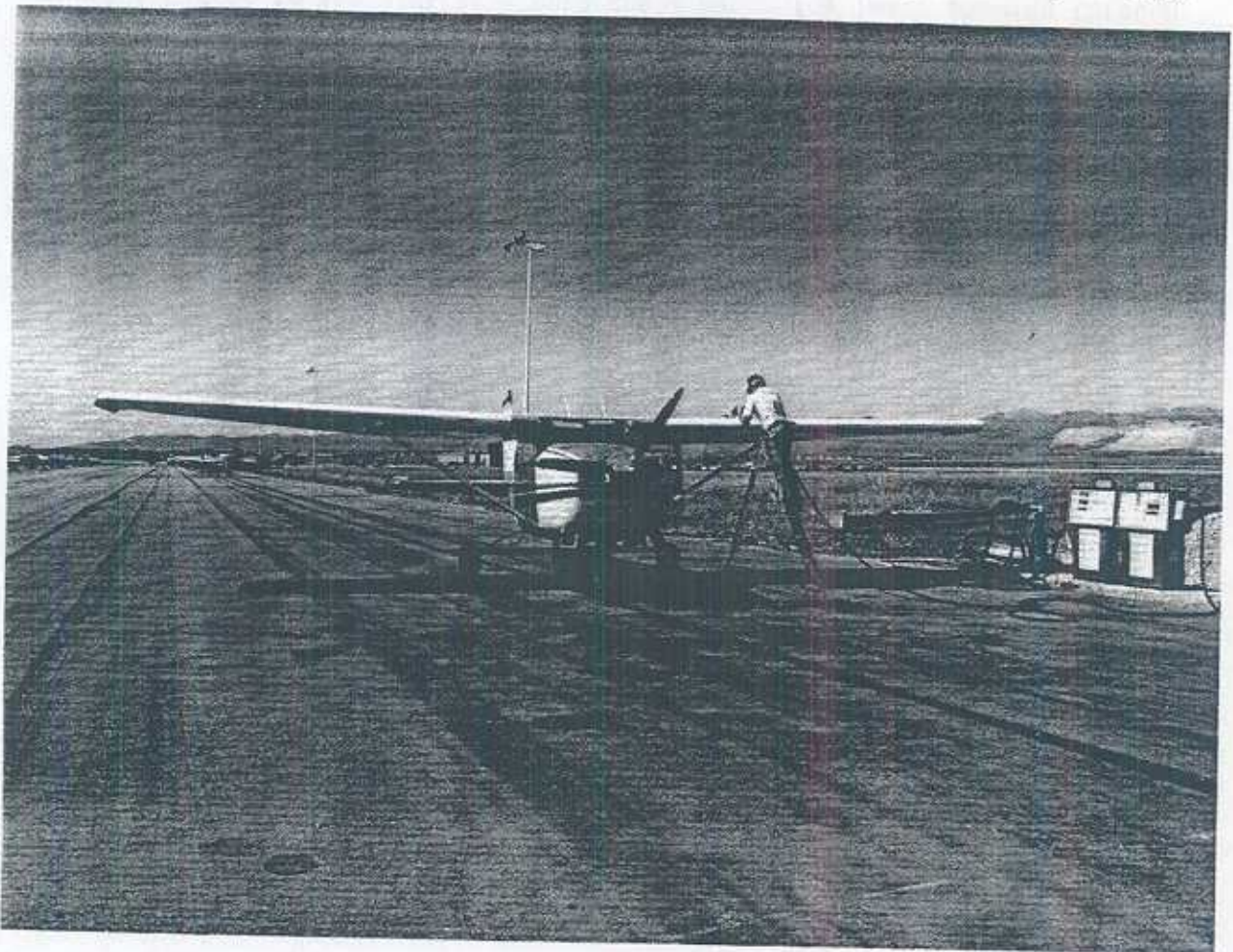


Figure 21. Typical aircraft used for aerial photography.

the map is adjusted to the map scale with the zoom lens. Field boundaries and other water-use boundaries are then traced on the 7½ minute quadrangle map. At the same time, a technician attempts to identify the category of land use or land cover and uses a code for the appropriate category in each water use area on the field map. The date that transfer of slide data was completed is also noted on the map. Figure 22 illustrates this basic procedure.

After the slide data is transferred to the quadrangle map, a two-person team uses the map in the field to check the boundaries and land use data on the quadrangle and marks in red the actual land use or land cover category if it is different than the category originally identified. After the land classification on the quadrangle map has been field-checked, the field team marks the completion date on the edge of the map. Figure 23 shows a Division of Water Resources field map after field-checking has been completed.



Figure 22. Transferring slide data to field map.



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The next step is to digitize and process the field data. Digitizing is the process of converting data from map or image form to digital form for computer analysis. Typically, digitizing and entering the categories of land use into the computer is performed during the fall and winter following the aerial photography. This is accomplished by using ESRI ARC/INFO Software and a digitizer board large enough to hold a quadrangle map. The division's digitizing work station is shown in Figure 24. All processed data is filed in the State AGRC database. The division uses the special data management and geographic information management capabilities of the AGR ARC/INFO system to produce tabulated water-related land use maps.



Figure 24. Digitizing work station.

Once the land use data has been digitized and processed through the AGRC ARC/INFO system, the division plots out a 7½ minute quadrangle line map of the data. These plots are overlaid on the field maps to check for errors in recording or digitizing. An example of a line map of the Monticello South quadrangle is shown in Figure 25.

Once checked, the data in the AGRC ARC/INFO system becomes available for use in water resource planning studies. A map of the Monticello South quadrangle, similar to what might be obtained from the AGRC, is shown in Figure 26.

Legend for Computer-Generated Line Maps in the Southeast Colorado River Basin Study Unit, referenced to Figure 25.

Label	Code	Cover Type
O	IA1a	Orchards
BR	IA1c	Vineyards & Other Horticulture
G	IA2a	Grain
C	IA2a1	Corn
V	IA2b	Vegetables
PO	IA2b1	Potatoes
ON	IA2b2	Onions
B	IA2b3	Beans
T	IA2b4	Tomatoes
S	IA2c	Other Row Crops
A	IA3a	Alfalfa
P1	IA3b	Grass/Hay
P	IA3d	Pasture
TF	IA3e	Turf/Grass Farms
F	IA4a	Fallow
I	IA4b	Idle
DG	IB1a	Non-irrigated Cropland
DA	IB2a	Non-irrigated Alfalfa
DP	IB2b	Non-irrigated Pasture
DF	IB3a	Non-irrigated Fallow
DI	IB3b	Non-irrigated Idle
IWP	IIA1a	Pasture (subject to spring flooding)
IWP1	IIA1b	Grass/Hay (subject to spring flooding)
WP	IIA2a	Sub-irrigated Pasture
WP1	IIA2b	Sub-irrigated Grass/Hay
WR	IIB	Wet Areas (cattails/bullrush, etc.)
WF	IIC	Wet Flats (mud flats w/little vegetation)
RIP	IIE	Riparian Areas
W	IIF	Open Water
WM	IIF4a	Temporarily Flooded
SL	IIF4b	Sewage Lagoons
EP	IIF4c	Evaporation Pond
R	VB1	Buildings/Homes (high density)
R2	VB2	Buildings/Homes (low density)
RP	VB3	Irr. Open Spaces (parks, golf courses, etc)
CM	VC1	Commercial
CI	VC2	Industrial
CS	VC3	Open Spaces

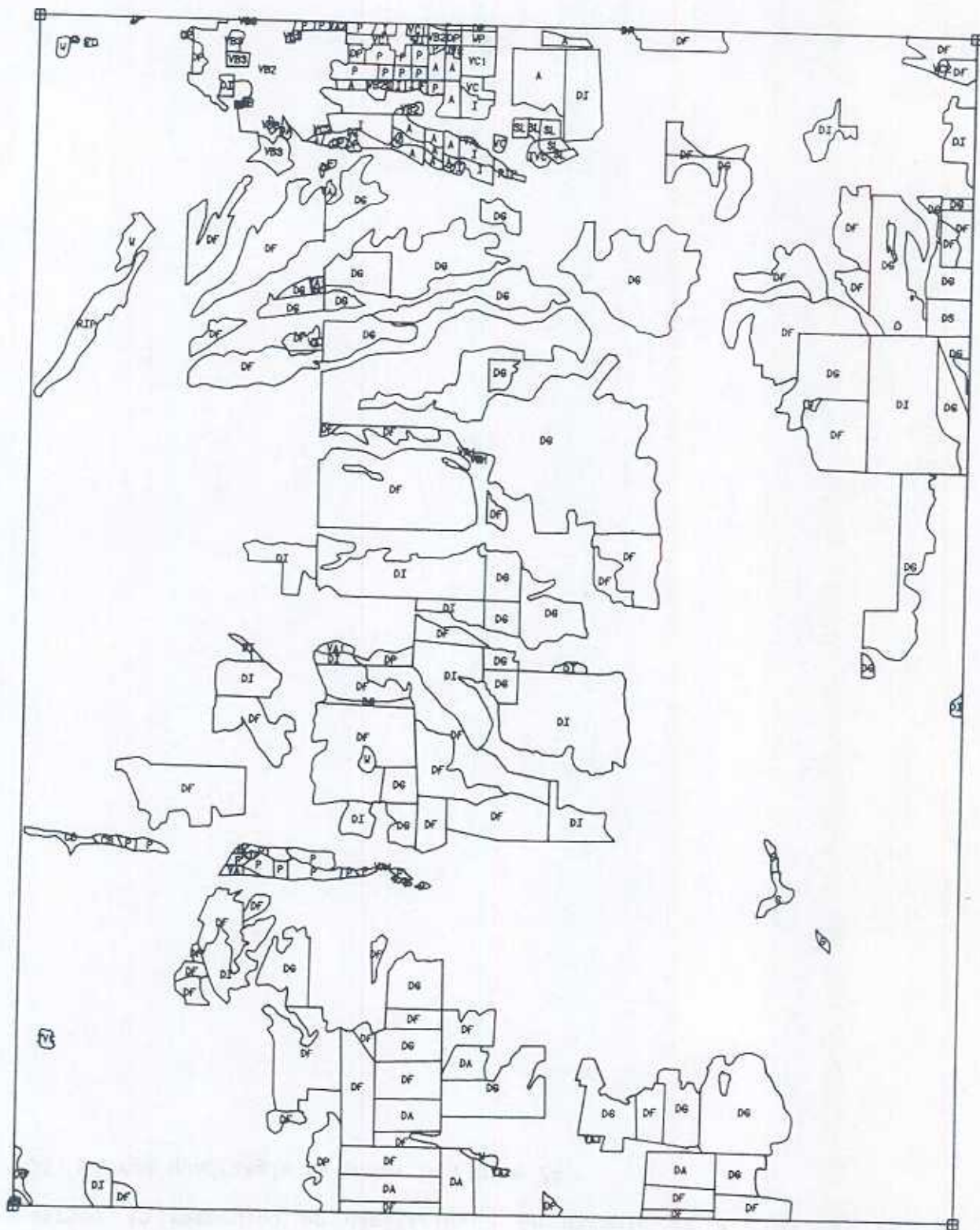




































Figure 25. Computer-generated line map of the Monticello South 7½ minute quadrangle.

Legend for Final Computer-generated Maps of the Southeast Colorado River Basin Study Unit, referenced to Figure 26.

	IA1a	FRUIT	
	IA1e	BERRIES	
	IA2a	GRAIN	
	IA2a1	CORN	
	IA2a2	SORGHUM	
	IA2b	VEGETABLES	
	IA2b1	POTATOES	
	IA2b2	ONIONS	
	IA2b3	BEANS	— IRRIG. CROPLAND
	IA2c	OTHER ROW CROPS	
	IA3a	ALFALFA	
	IA3b	GRASS HAY	
	IA3c	GRASS/TURF	
	IA3d	PASTURE	
	IA4a	FALLOW	
	IA4b	IDLE	
	IIA1a	PASTURE	
	IIA1b	HAYLAND	
	IIA2a	PASTURE	— GRASSY/PHREATO.
	IIA2b	HAYLAND	
	IB	NON IRR. CROPLAND	
	IB1a	GRAIN	
	IB2a	ALFALFA	
	IB2b	PASTURE	— NON-IRRIG. CROPLAND
	IB3a	FALLOW	
	IB3b	IDLE	
	IIC	WET FLATS	
	IIE	RIPARIAN	
	IIF	OPEN WATER	— GRASSY/PHREATO./WATER
	IIF4a	TEMP. FLOODED	
	IIF4b	SEWAGE LAGOON	
	VB	RESIDENTIAL	
	VB4	OPEN SPACES	— BUILT-UP LAND
	VC	COMMERCIAL/INDUSTR.	

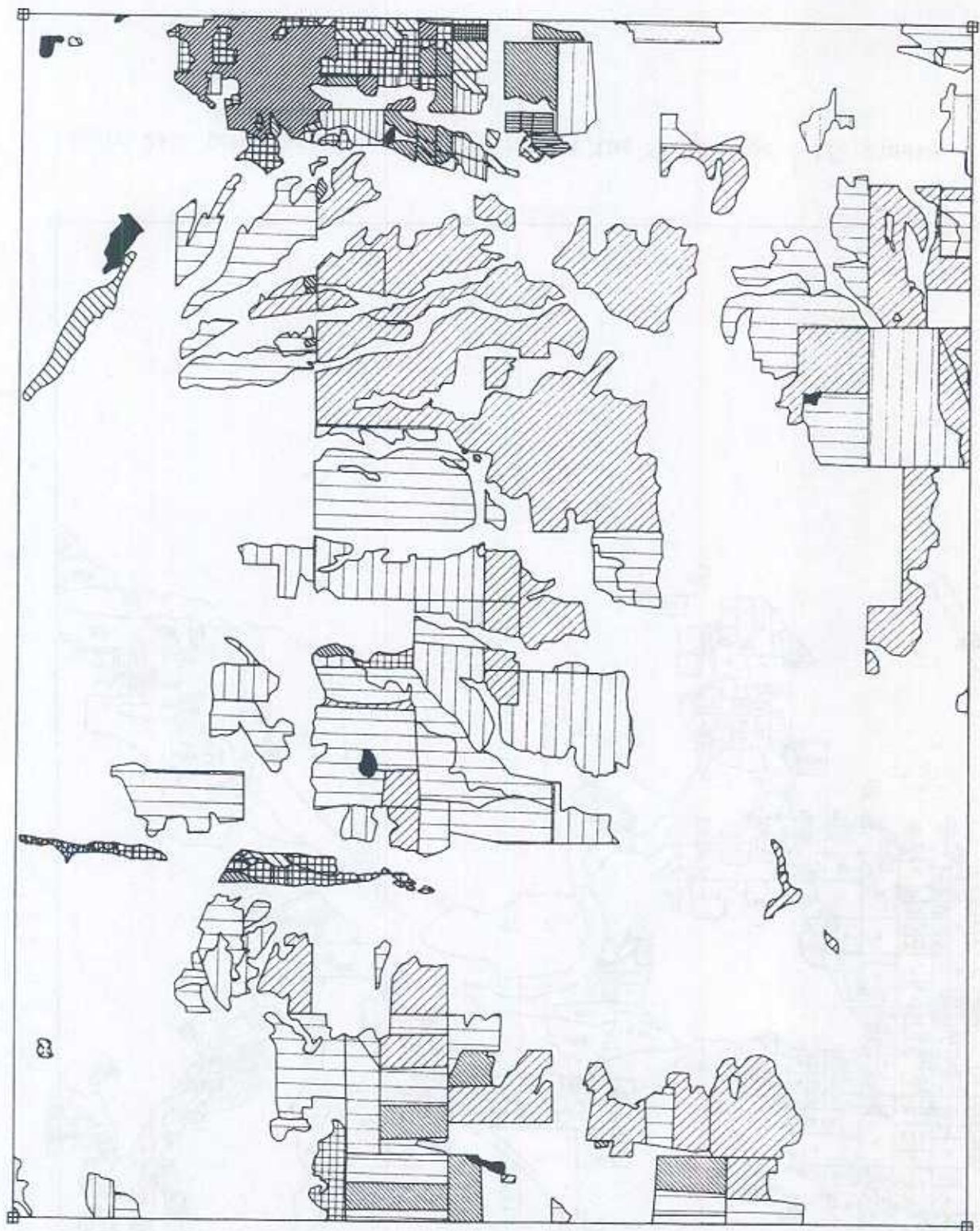


Figure 26. Final computer-generated map of the Monticello South 7½ minute quadrangle).

LAND USE CATEGORIES

During the division's years of collecting water-related land use data, land use categories and map codes have varied from inventory to inventory.

In late 1984, at the beginning of the division's new phase of mapping water-related land use, an Active Mappers Committee was formed. The committee reviewed all ongoing mapping efforts in the state and then focused on the issue of coordinating and standardizing map data. A summary of the committee's work is given in Appendix B. The division is committed to using the "1988 Standard Cover Types and Codes" list developed from this committee. Codes from this standard cover type list, with descriptive information, are shown in Table 1.

As each water-related land use inventory for the state is completed, and as some areas are re-inventoried, it becomes useful to tabulate and compare changes in these inventories. Because of the different cover type names and codes that have been used in the past, it becomes necessary to reference earlier codes and land cover types to the 1988 Standard Cover Types and Codes. Table 4 shows the codes from earlier studies that relate to the standard cover types and codes. Data from studies prior to 1988, which have been entered into the AGR library data base, have been adjusted to the 1988 Standard Code in this table. Some published reports may show the codes used prior to 1988. Appendix C lists the previous land use studies conducted by the division.

Table 4. List of cover types and land use codes for the State of Utah (standardized in 1988); with comparisons of the 1988 standardized cover type codes to the codes used in previous land use inventories.

STATE CODE	COVER TYPES (Standardized in 1988)	UTAH LK. (66)* BEAR R. (69) WEBER R. (70)	UINTAH (67) W. COLO. (67) VIRGIN R. (78) UINTA B. (80)	SALT LAKE COUNTY (82)	U. SEVIER (81) M. SEVIER (83) L. SEVIER (85) BEAR R. (86) WEBER R. (87)
I	Cropland	- ^a	-	-	* ^c
IA	Irrigated	A ^d	A	-	*
IA1	Hort. & Specialty Crops	-	-	-	*
IA1a	Fruit	A8	A16	-	*
IA1a1	Cherry	-	-	-	*
IA1a2	Apple	-	-	-	*
IA1a3	Peach	-	-	-	*
IA1a4	Pear	-	-	-	*
IA1a5	Apricot	-	-	-	*
IA1a6	Other	-	-	-	*
IA1b	Nuts	-	-	-	*
IA1b1	Walnut	-	-	-	*
IA1b2	Pecan	-	-	-	*
IA1b3	Other	-	-	-	*
IA1c	Vineyard	-	-	-	*
IA1d	Bush Fruit	-	-	-	*
IA1e	Berries	-	-	-	*
IA1f	Nurseries	-	-	-	*
IA1g	Other	-	-	-	*
IA2	Row & Close-Grown Crops	-	-	-	*
IA2a	Grain	A4	-	Ag	*
IA2a1	Corn	A5	A1	-	*
IA2a2	Sorghum	-	-	-	*
IA2a3	Wheat	-	A9	-	*
IA2a4	Barley	-	A7	-	*
IA2a5	Oats	-	A8	-	*
IA2a6	Other	-	-	-	*
IA2b	Vegetables	-	-	-	*
IA2b1	Potatoes	A7	A3	-	*
IA2b2	Onions	-	-	-	*
IA2b3	Beans	A13	-	-	*
IA2b4	Tomatoes	A10	A5	-	*
IA2b5	Sweet Corn	-	-	-	*
IA2b6	Other	A6,A9,A11	A2,A4,A6	-	IA2b5*

- * The data in parentheses (66) identifies the year the field checking was conducted for the various inventories.
^a The dash (-) indicates that there was no corresponding cover type mapped for the above inventories.
^c The asterisk (*) indicates that the cover type for the above inventories is the same as the 1988 standard cover types.
^d The use of a code, such as the (A) footnoted, indicates that the code used for the above inventory corresponds to the 1988 standard cover types.
^e The codes that appear in this column are those that are different than the 1988 standard code.

Table 4. Continued.

STATE CODE	COVER TYPES (Standardized in 1988)	UTAH LAKE (66)* BEAR R. (69) WEBER R. (70)	UINTAH (67) W. COLO. (67) VIRGIN R. (78) UINTA B. (80)	SALT LAKE COUNTY (82)	U. SEVIER (81) M. SEVIER (83) L. SEVIER (85) BEAR R. (86) WEBER R. (87)
IA3	Forage Crops	-	-	A	*
IA3a	Alfalfa	A1	A10	-	*
IA3b	Grass Hay	A3	A12	-	*
IA3c	Grass/Turf	-	-	-	IA3e
IA3d	Pasture	A2	A13	-	*
IA3e	Other	-	A11	-	IA3c
IA4	Other	-	A18	Ai	*
IA4a	Fallow Plowed	-	-	-	*
IA4b	Idle (Overgrown)	A12	A17	-	*
IB	Non-Irrigated	E	B	D	*
IB1	Row & Close-Grown Crops	-	-	-	*
IB1a	Grain (Beans, Seeds)	E1	-	-	*
IB1a1	Wheat	-	B2	-	*
IB1a2	Other Grains	-	B3	-	*
IB1a3	Dry Beans	-	B4	-	*
IB1a4	Safflower	-	-	-	*
IB2	Hayland Crops	-	-	-	*
IB2a	Alfalfa	E2	B1	-	*
IB2b	Pasture	E3	B5	-	*
IB2c	Other	E5	-	-	*
IB3	Other (Plowed)	-	B7	-	*
IB3a	Fallow	E4	B6	Df	*

- * The data in parentheses (66) identifies the year the field checking was conducted for the various inventories.
 " The dash (-) indicates that there was no corresponding cover type mapped for the above inventories.
 " The asterisk (*) indicates that the cover type for the above inventories is the same as the 1988 standard cover types.
 " The use of a code, such as the (A) footnoted, indicates that the code used for the above inventory corresponds to the 1988 standard cover types.
 " The codes that appear in this column are those that are different than the 1988 standard code.

Table 4. Continued.

STATE CODE	COVER TYPES (Standardized in 1988)	UTAH LAKE (66)* BEAR R. (69) WEBER R. (70)	UINTAH (67) W. COLO. (67) VIRGIN R. (78) UINTA B. (80)	SALT LAKE COUNTY (82)	U. SEVIER (81) M. SEVIER (83) L. SEVIER (85) BEAR R. (86) WEBER R. (87)
II	Meadow/Wetlands/Open Water	C	O, F	-	*
IIA	Grassy Aspect	-	-	-	*
IIA1	Irrigated	-	-	-	*
IIA1a	Pasture	-	A14	-	IIA1a1, 2a1
IIA1b	Hayland	-	A15	-	IIA1a2, 2a2
IIA2	Non-Irrigated	-	-	-	*
IIA2a	Pasture	C4	8, F8	Ws	IIA1b1, 2b1
IIA2b	Hayland	-	-	-	IIA1b2, 1b2
IIA2c	Non-Agricultural Use	-	-	-	IIA1b3, 2b3
II8	Cattail/Bullrush	C1	F4	Wc	*
IIc	Wet Flats (barren)	-	-	M	*
II0	Shrub Aspect	C5	F2	-	*
IIe	Riparian	C2	-	Wr	*
IIe1	Forested Aspect	-	F1	-	*
IIe2	Shrub Aspect	C3	3, 5, 6, 7, 9	-	*
IIF	Open Water	B	E	-	*
IIF1	Streams	-	-	-	*
IIF2	Reservoirs	-	E1, E2	-	*
IIF3	Ponds/Lakes	-	E4	-	*
IIF4	Other	-	E3	-	*
IIF4a	Temporarily Flooded	-	-	-	*
IIF4b	Sewage Lagoon	-	-	-	*
IIF4c	Evaporation Pond	-	-	S	IIFAC, VC2

- * The data in parentheses (66) identifies the year the field checking was conducted for the various inventories.
 * The dash (-) indicates that there was no corresponding cover type mapped for the above inventories.
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Table 4. Continued.

STATE CODE	COVER TYPES (Standardized in 1988)	UTAH LAKE (66)* BEAR R. (69) WEBER R. (70)	UINTAH (67) W. COLO. (67) VIRGIN R. (78) UINTA B. (80)	SALT LAKE COUNTY (82)	U. SEVIER (81) M. SEVIER (83) L. SEVIER (85) BEAR R. (86) WEBER R. (87)
III	Range & Forest Land	-	-	-	*
IIIA	Alpine Plants	-	-	-	*
IIIB	Conifer	-	-	Uc	*
IIIB1	Douglas/White Fir	-	-	-	*
IIIB2	Ponderosa	-	-	-	*
IIIB3	Fir/Spruce	-	-	-	*
IIIB4	Lodgepole Pine	-	-	-	*
IIIB5	Pinyon-Juniper	-	-	-	*
IIIB6	Etc.	-	-	-	*
IIIC	Deciduous	-	-	Ud	*
IIIC1	Aspen	-	-	-	*
IIIC2	Mountain Brush	-	-	-	*
IIIC3	Etc.	-	-	-	*
IIID	Grass Aspect	-	-	-	*
IIID1	Dry Pasture	-	-	-	*
IIID2	Native Grasses	-	-	Ug	*
IIID3	Etc.	-	-	-	*
IIIE	Shrub Aspect	-	-	-	*
IIIE1	Northern Desert Shrub	-	-	Um	*
IIIE1a	Sagebrush	-	-	-	*
IIIE1b	Etc.	-	-	-	*
IIIE2	Southern Desert Shrub	-	-	-	*
IIIE2a	Creosote Bush	-	-	-	*
IIIE2b	Etc.	-	-	-	*
IIIE3	Salt Desert Shrub	-	-	-	*
IIIE3a	Shadescale	-	-	-	*
IIIE3b	Greasewood	-	-	-	*
IIIE3c	Saltbrush	-	-	-	*
IIIE3d	Desert Mallee	-	-	-	*
IIIE3e	Etc.	-	-	-	*

- * The data in parentheses (66) identifies the year the field checking was conducted for the various inventories.
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APPENDIX A

Hydrologic Inventories

Utah Lake Drainage Area. In cooperation with Utah State University. November 1969. 136 pages - includes substantial climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, geology, economy, history, and physiography.

Uintah Study Unit. In cooperation with Utah State University. March 1970. 181 pages - includes substantial climatic, streamflow, and groundwater data, detailed water budgets, and more general information on topography, geology, arable lands, history, economy, water quality and water development and management. (out of print, file copy only)

Weber River Study Unit. In cooperation with Utah State University. August 1970 - includes substantial climatic, streamflow and groundwater data, detailed water budgets, and more general information on topography, geology, economy, and water quality.

Great Salt Lake Desert Area. In cooperation with Utah State University. November 1971. 70 pages - includes substantial climatic and water resources data, water budget for Tooele Valley, and more general information on physiography, economy, geology, and water management aspects.

Bear River Study Unit. In cooperation with Utah State University. February 1973. 126 pages - includes substantial climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

Price River Study Unit. June 1975. Includes climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

Escalante River Study Unit. December 1976. Includes climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

Dirty Devil River Study Unit. January 1977. Includes climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

APPENDIX A Continued

San Rafael River Study Unit. January 1977. Includes climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

Update of the Price River Study Unit. June 1978. Includes updated climatic, streamflow, and water use data and detailed water budgets.

Update of the San Rafael River Study Unit. December 1979. Includes updated climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

Virgin and Kanab Study Units (Utah's Lower Colorado River Area). February 1983. Includes climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

Hydrologic Inventory of Colorado, Dolores, and San Juan Study Units. September 1987. Includes climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

Hydrologic Inventory of the Sevier River Basin. January 1991. Includes climatic, streamflow, and groundwater data, detailed water budgets, and more general information on water quality, topography, geology, and economy.

APPENDIX B

In late 1984 at the beginning of Division of Water Resource's new phase of mapping water-related land use, an Active Mappers Committee was formed. Water Resources of the Department of Natural Resource and Agriculture Development and Conservation of the Department of Agriculture co-chaired this committee. Lloyd Austin of Water Resources and Jim Christensen of Agriculture filled these roles. Member agencies were:

- Utah State Automated Geographic Reference System
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation
- The Center for Remote Sensing, University of Utah
- Utah Department of Transportation
- Utah Department of Agriculture
- Utah Department of Natural Resources
- Utah State Department of Health - Water Pollution
- Utah State Division of Water Resources
- Utah State Division of Water Rights
- Utah State Division of Wildlife Resources
- U.S. Soil Conservation Service
- Utah Division of State Lands and Forestry
- Utah Geological and Mineral Survey
- U.S. Fish and Wildlife
- U.S. Forest Service
- U.S. Geological Survey
- Utah State University-Extension Service

The committee surveyed all ongoing mapping efforts and then focused on the issue of coordinating and standardizing map data. The relationships between several state agencies and the AGRC program of the Office of Planning and Budget were also clarified. Three specific products came from this committee's work. The first was a standardized definition of a base resource data map file as follows:

APPENDIX B Continued

<u>Layers of Data</u>	<u>Level of Detail</u>
Infrastructure & Base	Map Quadrangle Sheet (USGS Topo) 1:24,000 scale
Ownership	Federal/State/Private, 1:250,000 scale
Soils	Level 3 definition with at 1:24,000 scale
Land Cover	Standard legend using 1:24,000 scale
Climate	Precipitation/Temperature 1:250,000 scale

Secondly, a standard legend for a cover map was developed and agreed upon which allows a hierarchy of data entry. This is shown as Table 1. The headings which are marked with an asterisk were minimum required for the base data set. Individual agencies could use finer breakdowns as needed for their specific programs.

The Division of Water Resources used only certain categories in the Bear River mapping which were considered necessary for water use budgets being prepared. All rangeland and forestland categories were left off while some categories were subdivided further than required by the base data set standards.

The third agreement reached by the committee was the use of a standard set of watershed units for the state. It was agreed that the maps developed by the United States Geological Survey working with National Water Resources Council would serve as the base standard. Individual agencies could then further subdivide these larger units for specific study purposes. This proposal was also presented to the Resource Development Coordinating Committee during the year 1986 and ratified.

APPENDIX C

Water-Related Land Use Studies

- Utah Lake Drainage Area. In cooperation with Utah State University.
February 1968 - detailed water-related land use tables and maps.
- Bear River Drainage Area. In cooperation with Utah State University.
April 1969 - detailed water-related land use tables and maps.
- Weber River Drainage Area. In cooperation with Utah State University.
February 1970 - detailed water-related land use tables and maps.
- Uinta Hydrologic Area. Staff Report No. 7. September 1971 - detailed water-related land use tables and maps.
- West Colorado Hydrologic Area. Staff Report No. 8. January 1972 - detailed water-related land use tables and maps.
- Uinta Basin. In cooperation with U.S. Soil Conservation Services and National Aeronautics and Space Administration. 1980. Contains detailed water-related land use maps and tables. Investigates the use of landsat data concurrently with the high altitude color infrared photography to update the changing patterns of land use. Performed under contract with the Center for Remote Sensing and Cartography of the University of Utah Research Institute. 109 pages plus maps.
- Sevier River Basin (Upper Portion), 1981. Contains detailed water-related land use maps and tables. Performed under contract with the Center for Remote Sensing and Cartography of the University of Utah Research Institute. 27 pages plus maps.
- Sevier River Basin (Lower Portion), 1985. Contains detailed water-related land use maps and tables.
- Salt Lake County, 1982. Contains detailed water-related land use maps and tables. Performed under contract with the Center for Remote Sensing and Cartography of the University of Utah Research Institute. 24 pages plus maps.
- Sevier River Basin (Middle Portion), 1984. Contains detailed water-related land use maps and tables. Performed under contract with the Center for Remote Sensing and Cartography of the University of Utah Research Institute. 34 pages plus maps.
- Virgin River Area, 1990. Contains detailed water-related land use maps and tables. Performed in cooperation with USDA Soil Conservation Service, St. George, Utah office and Utah Division of Water Rights, Cedar City Area Office. 56 pages plus maps.

APPENDIX C Continued

Bear River Basin, 1991. Contains detailed water-related land use maps and tables. Performed in cooperation with Utah Division of Water Rights. 50 pages plus maps.

Columbia River Basin, 1991. Contains detailed water-related land use maps and tables. Performed in cooperation with Utah Division of Water Rights. 41 pages plus maps.